Railway Age

Vol. 78, No. 26 *May 30, 1925*

Table of Contents Appears on Page 5 of Advertising Section

Trends in Stores Practice

ABOUT two years ago a popular weekly publication of wide circulation presented an account of railway storekeeping that created much displeasure among the group from which the characters were drawn. Last week's convention of Division VI-Purchasing and Stores, American Railway Association, in St. Louis, which was attended by more than 400 railway purchasing and stores officers, gave a most favorable impression of the work of this department. In this respect the account of conditions found on the Union Pacific is also recommended for study; the *Railway Age* of May 9, carried the first of three articles on the purchasing and stores organization of this road. The description was continued in the issue of May 16, and is concluded in this number. It is probable that imperfections are present in this system of purchasing and stores operations, but it affords a striking example with which to demonstrate a state of efficiency and progress in transportation comparable to that claimed for other fields of industrial enterprise. These conditions on the Union Pacific, after all, are with few exceptions but representative of conditions on numerous other roads throughout the country. This indicates that trends in stores practices are substantially in the right direction and constitutes an added cause for optimism concerning railway progress in general. It should also remind other railway departments of their own interest in co-operating with their stores organizations in attaining a high standard of service and efficiency.

Railroading a Business—Not a Sport

A CERTAIN sportsman, who makes a serious business of amusing himself by running high-speed motor boats, had announced his intention of "racing" the Twentieth Century Limited from Albany to New York. While he was busy with his preparations, however, another sportsman of similar habits stole a march on him by "beating" the Century from New York to Albany. We use quotation marks around the words which imply a contest, because there was in reality no contest at all. The railroad in no case authorized its train-crews to take any notice of the "race" or in any way to depart from their regular schedules, which have been worked out with extreme care after decades of experience and which are usually met day in and day out. The folly of comparing extraordinary performances of one type of locomotion with the regular performances of another is apparent to all thoughtful persons. We welcome therefore the timeliness of an editorial in the New York World which emphasized just this point in commenting on the "race." Its remarks, however, have been given even greater force by subsequent events. Sportsman No. 1 was not particularly pleased with the advantage No. 2 had taken of him. It was up to him to "beat," not only the Century, but the record of No. 2 as well. His "race" was scheduled for Monday morning. *But*—it rained on Sunday! Therefore, the "race" was postponed until Tuesday. On the rainy Sunday the Century was only seven minutes late and on Monday it arrived at Grand Central Station on time. The carrying of many passengers at reasonable rates, with comfort and at as great a speed as safety permits, and to do these things in foul weather as well as fair—this is the railroad's accomplishment. This is the business of transportation. And the railroads are engaged in business—not sport.

Court Modifies Train-Control Order

FOR the first time, the merits of the federal law requiring railroads to install automatic train control devices, have this week been made the subject of a judicial decision; and the course thus far pursued by the Interstate Commerce Commission is sustained, except in the important detail that when the commission changed its mind, in July, 1924, and allowed the use f a forestalling device on the locomotive, it thereby modified the conditions so radically that the two-year period allowed for compliance must be begun over again; completion of installation is not required until July, 1926. This extension of time is the salient point in the decision in the Delaware & Hudson suit, reported in another column; and evidently the law thus laid down will apply in favor of any road which, having planned to comply with the original order, desires, for the purpose of saving expense, or to simplify the apparatus or the practice, or for any reason, to introduce the forestalling device. The views of the three judges on the question of constitutionality, on the alleged inadequacy of the commission's studies, and as to the expenditure by railroads of large sums of money for experimental work, are quite sweeping; and if not challenged by an appeal to the higher court will give a different aspect to some phases of the Interstate Commission's acts in the field of railroad safety.

Why Stop a Train Three Times?

TO reduce delays, economize on fuel and reduce the liability of pulling out drawbars, railroad officers are investigating ways of eliminating train stops as never before. The cost of a train stop varies with the train load, the speed and the grades, but various tests and reports fix the average cost of a freight train stop at between $5 and $6. Be that as it may, depending on local conditions, the deciding factor in most cases is the track capacity and the train stops occasioned when entering and leaving a siding are under many circumstances causing cumulative delays that restrict the capacity of the division. The question arises why the stops, ordinarily required to permit the switches to be opened and closed when entering and leaving a passing track, can not be eliminated. Numerous roads have installed power switch machines for this pur-

pose controlled from the nearest telegraph office. One road has five such installations in service, one of which is eight miles from the control point; the operating officers are enthusiastic over the improvement in train operation. Reports from various roads having a total of nearly 100 such installations in service show an average saving that represents from 25 to 100 per cent on the investment. Division operating officers knowing of passing tracks where physical conditions result in difficulties of starting trains may well investigate the cost of an installation of remote-control power switch machines.

Why Freight Rates on Different Commodities Vary

THE question as to why freight rates are made as they are on the various commodities of commerce is at the present time one of nationwide interest. This question always has greatly puzzled many people. The rates charged per ton for transporting different commodities the same distances vary widely, and the freight rate structure of the country often is criticized as an archaic jumble. Interest in the subject at the present time is especially widespread and keen because the Hoch-Smith resolution passed at the last session of Congress directs the Interstate Commerce Commission to make a general investigation to determine whether a readjustment of rates on the various commodities should not be made, and seems especially to enjoin the Commission to consider whether rates should not be made more nearly in proportion to the value of commodities. The purpose of those who wrote this resolution is well known to have been to try to bring about special reductions in the rates on farm products.

In view of the prevailing interest in the subject and of the investigation that the Commission is undertaking, it is well worth while to restate the general principles upon which rates have been based and present some facts showing why the basing of rates on these principles results in the great variations in the rates charged upon different commodities.

Broadly speaking the rates upon different commodities have been and are based, first, upon the cost incurred by the railways in transporting them, and, second, upon the value of the service rendered in transporting them. The cost incurred by the railways in transporting each ton of a commodity a given distance depends principally upon the average number of tons of that commodity loaded in each car. The value of the service rendered in transporting it depends principally on the value of the commodity.

Most of the cost of rendering the service is incurred irrespective of the number of tons of a commodity loaded in a car and, therefore, the cost per ton of transporting it will be relatively large if the number of tons of it loaded per car is small, and relatively small if the number of tons of it loaded per car is large. The differences in the average numbers of tons of the various commodities loaded per car are extremely wide. The differences in their average values per ton are even greater.

The American Railway Association recently has published a bulletin giving the average tons loaded per car in 1924 of the sixty-nine commodities or groups of commodities shipped in carload quantities. A statement furnished to a congressional committee sometime ago gave actual figures or estimates regarding the value in 1922 of all these commodities at the destinations to which they were shipped. The table presented herewith gives the average loadings per car of these commodities in 1924 and their estimated average values per ton in 1922. The prices of most commodities have changed considerably since 1922, but the figures given in the table are sufficient to indicate strikingly the great differences in their values per ton which existed not only in 1922, but which still do and always must exist.

Commodity	Average tons per loaded car year 1924	Average value at destination year 1922
Iron ore	53.5	$4.12
Bituminous coal	51.7	5.53
Other ores and concentrates	51.6	27.77
Clay, gravel, stone and sand	49.8	2.26
Iron, pig and bloom	49.4	23.71
Anthracite coal	49.1	7.75
Base bullion and matte	48.0	69.33
Other products of mines	43.0	13.33
Rails and fastenings	40.9	43.62
Wheat	40.8	37.75
Cement	38.0	16.26
Corn	37.6	24.74
Other metals, P. B. & S.	36.0	206.58
Crude petroleum	35.8	13.26
Brick and art. stone	35.5	5.96
Other grain	35.2	31.03
Coke	34.7	9.82
Asphaltum	34.3	15.86
Oats	31.5	27.22
Bar and sheet iron, etc.	31.4	50.50
Pulp wood	30.8	12.54
Logs, posts, poles and cord wood	30.5	8.32
Other products of agriculture	30.4	103.56
Chemicals and explosives	30.2	105.97
Ties	29.7	19.69
Ref. petroleum and its products	28.2	50.20
Sugar, syrup, glucose and molasses	28.0	129.99
Vegetable oils	27.4	212.54
Salt	26.8	9.46
Lumber, timber, etc.	26.3	23.67
Ice	25.5	6.13
Lime and plaster	25.4	12.51
Dried fruits and vegetables	24.6	214.75
Flour and meal	24.4	79.50
Paper, printed matter and books	24.2	79.96
Other mfg. and miscellaneous	23.7	200.00
Cotton seed and products	23.2	45.58
Fertilizers	23.0	20.79
Canned goods	22.9	139.85
Other animal products	21.9	210.00
Other mill products	21.5	59.44
Other forest products	20.8	30.46
Hides and leather	20.5	600.00
Castings, machinery and boilers	19.7	208.73
Beverages	18.8	157.07
Potatoes	17.9	37.74
Sewer pipe and drain tile	17.8	10.23
Other packing house products	16.2	312.00
Citrus fruits	15.7	99.45
Agricultural implements and vehicles	15.0	138.42
Boats and vessel supplies	14.7	160.60
Other fresh fruits	13.5	87.23
Fresh meats	12.6	382.31
Butter and cheese	12.5	734.00
Wool	12.5	1,052.00
Hay, straw and alfalfa	12.5	17.45
Other fresh vegetables	12.4	52.63
Cattle and calves	11.5	176.40
Textiles	11.5	500.00
Horses and mules	11.4	155.52
Cotton	11.3	421.22
Eggs	11.2	469.22
Poultry	11.1	474.74
Tobacco	10.7	471.06
Sheep and goats	9.7	143.00
Household goods and second hand furniture	9.7	110.16
Hogs	9.5	184.40
Furniture (new)	8.9	318.18
Automobiles and automobile trucks	8.2	400.08

The statistics published by the American Railway Association show that the average loading of all products of mines is about 49.7 tons per car; products of forests, 28.1 tons; manufactures and miscellaneous, 25.9 tons; products of agriculture, 24.4 tons and animals and their products, 11.8 tons. Both products of agriculture and animals and their products are mainly farm products. Those to whom the rates on farm products seem relatively high may find one of the reasons in the fact that the average number of tons of them loaded in each car is less, and that in consequence the average cost per ton of transporting them is greater, than is true of any other large group of commodities.

The maximum difference in average tons loaded per car is between automobiles and automobile trucks, 8.2 tons, and iron ore, the average load of which is 53.5 tons, or six and one-half times as great. The statistics of average loading disclose some curious facts. Who, for example,

except those initiated in rate making, would expect to find that the average loading of sheep and goats is the same as that of household goods and second-hand furniture? Who would expect to find that the average loading of cattle and calves and of textiles is the same?

When the average value per ton and average load per car of different commodities are considered together, some striking facts bearing upon railway rate making are disclosed. While iron ore is the heaviest loading commodity, and automobiles and automobile trucks the lightest loading at the prices prevailing in 1922 the average car load of ore was worth only $220.42, while the average carload of automobiles and automobile trucks was worth $3,281, or almost fifteen times as much. The average carload of clay, gravel, sand and stone was almost 50 tons, and the average carload of poultry only 11 tons. The average carload of clay, etc., however, was worth only $112.55, while the average carload of poultry was worth $5,269.61. The average freight rate per ton on the clay, etc., was only $1.03, while on the poultry it was $34.74, and yet the freight rate on the clay, etc., was 45 per cent of its value at destination, while the freight rate on the poultry was only 7 per cent of its value at destination. Is it any wonder, in view of such facts, that those who make and regulate rates on the various commodities have difficulty in adjusting them reasonably in proportion to the cost of transporting them and the rates that shippers can afford to pay on them?

Clay, gravel, sand and stone have the smallest value per ton of any commodities shipped. Most readers will be surprised to learn that of all commodities shipped in carload lots, wool has the greatest value, its average value per ton being $1,052, its average loading per car 12.5 tons and its average value per carload $13,150. Butter and cheese have the second greatest value per ton, $734, the average load per car being 12½ tons and the average carload being worth $9,175. Bituminous coal, with an average loading of 51.7 tons per car was worth in 1922 an average of only $286 per car, at destination and because of the decline in its price it is worth still less now.

Since the Hoch-Smith resolution is well known to have been intended to lighten the so-called "burden" of freight rates on agricultural products, it is interesting to compare their average loading and value per car with those of other commodities. Since 1922, according to the Federal Reserve Board, the average wholesale prices of agricultural products has increased 19.3 per cent, that of animal products has declined 4 per cent and that of mineral products has declined almost 18 per cent. Prices of forest products have changed hardly at all and those of so-called "consumers goods," which are substantially the same as those classified by the Interstate Commerce Commission as manufactures and miscellaneous, have increased 3.3 per cent. Allowing for these changes it is found that the average load and value per car of these commodities in 1924 were approximately as follows:

	Average tons per car	Average value per car load
Agricultural products	24.4	$1,826
Animal products	11.8	2,940
Mineral products	49.7	235
Forest products	28.1	481
Manufactures and miscellaneous	25.9	2,848

The freight rates on agricultural and animal products in 1924 averaged about 6.41 per cent of their value, on mineral products about 44.4 per cent, on forest products 23.5 per cent, on consumers' goods 4.79 per cent, and on all commodities about 7½ per cent. Present freight rates on farm products were put into effect on January 1, 1922. The total freight charges on farm products annually are from 700 to 800 million dollars, while the increase in the total net value of farm products in 1924 over 1921, as estimated by the Department of Agriculture, was $3,986,000,000, or about five times as great as the total freight rates paid upon them annually.

It is somewhat difficult to believe, in view of the above facts, that the Interstate Commerce Commission, as a result of its general investigation of rates, will find that there is any justification for making any special reduction of rates on farm products. As a matter of fact if it should base a general readjustment of rates on the principles laid down in the Hoch-Smith resolution, it would make advances rather than reductions in the rates on most farm products.

Railway Clubs Close Successful Season

THE past two weeks have witnessed the final meetings of the season of most of the railway clubs. Except for summer outings most of them will not meet again until next September. The season has been characterized by a further broadening and strengthening of these clubs. While some highly technical topics have been discussed, the program for the clubs as a whole has included the presentation and discussion of not a few operating and public relations questions and an increasing number of addresses dealing with employee relations. Indeed, it may well be said that the big contribution that the clubs in general have made this year has been to stimulate interest in improving employee relations or, expressed in other terms, in personnel administration or better management. The railway field is looking more and more to the clubs for help and guidance in this respect.

If some committee or foundation were to award a prize for the best paper presented before a railway club during the year, to whom would it be awarded? The question is naturally a difficult one to answer. It would first be necessary to define a basis upon which the award should be made. Should the paper or address be judged on the printed report—carefully edited—or upon the combination of such a report and the force with which the subject was presented at the meeting and the effect upon those present? Should the experience and background of the speaker be taken into consideration—that is, whether his remarks were based upon actual experience and practical demonstrations, or upon theoretical considerations, or what might be designated as laboratory experiments? Should the award be made on the basis of the force of the appeal to a specific group or the broader basis of the needs of the club membership as a whole?

The last question is suggested because the whole attitude and objective of the railway clubs has been changing in recent years. Formerly these clubs were promoted largely by mechanical department officers and supervisors and the programs were almost invariably of a highly technical nature. Today the clubs attract men from most all departments and their programs relate more to those general topics or discussions in which all or the greater proportion of the members may find some interest. Even the more or less highly technical subjects are frequently so selected that they may be discussed from the standpoint of more than one department. The effect of this has been to help in breaking down department walls and to emphasize the fact that the members should be interested in the railroad as a whole rather than exclusively in the narrow interests of a particular department. For these reasons it would appear that the last question above suggested

would have to receive some consideration in deciding upon the best paper or address.

Considering all these facts the *Railway Age* would hardly have the temerity to suggest the prize winner. We might suggest, however, that one paper would qualify for a position somewhere near the top of the list. Consider a successful, practical operating officer who has given much attention, as well as hard and scientific study, to the problem of trying how best to direct and lead those under him. Consider the problem not only of making oneself heard, but in forcefully getting a real message over in a ballroom—not an auditorium—in which there were between 700 and 800 men, a goodly number of them smoking. And, finally, consider a topic so vital and so broadly applicable as that of "Lubricating a Railroad Organization." We submit that R. E. Woodruff, superintendent of the Erie, is entitled to special credit for the straight-from-the-shoulder talk on this subject which he made at the May meeting of the New York Railroad Club.

New Lines Cost More Today

WHILE frequent reference is made to the marked falling off of new line construction in this country little attention has been directed to the marked difference in the cost of building a mile of line of railroad today and 20 years ago. Yet this difference is very pronounced. Much of this can be accounted for by the change in the value of a dollar; a million dollars will buy far less in railroad construction than formerly. But the largest factor in the increase in cost is the marked advance in the standards of construction. In these days new lines of railroad cannot be justified unless there is promise of a fair amount of traffic within a reasonable development period. In many parts of the country the minor branch lines have become a burden rather than a benefit. It is not surprising therefore that the new mileage being built consists more largely of main line routes or of lines which lend themselves to incorporation in proposed through routes.

This change in the nature of the average mile of new line, together with the far more exacting requirements imposed on all railway lines, has brought about a marked change in the standards of construction. In the first place the track standards are much higher than formerly. Not only is the rail heavier but treated ties, tie plates, rail anchors and heat treated bars and bolts are now generally recognized features of the track on new as well as on established lines. The same holds true of the roadbed, which is now given a more generous width in cuts and on fills. But of even greater significance is the change in ideas as to the relation of gradient and alinement to the country traversed. The 0.3 per cent grade is now not infrequently adopted in rough country where the 1.0 per cent grade was once considered the most favorable that could be had. The adoption of a flat gradient not only entails much heavier grading but also imposes more severe problems in the disposal of local drainage. It cannot be made to "fit the country" as well as a steeper grade line, with the result that the grade will not infrequently pass below the cross drainage with heavy expense for surface ditching or troublesome syphons. Large valleys are crossed at much higher elevations, which means that the large culverts which are required for the waterways must carry enormous embankment loads. Another item of expense not formerly imposed is the provision for grade separation at highway crossings, which is now demanded by public authorities and which the railroads have recognized as a highly desirable object in the building of new lines. An idea of the magnitude of this one phase of railway construction today is to be had from the fact that on a line now being built through what is by no means highly developed country the crossings with 70 highways are being separated in as many miles of line.

In the face of these greater costs the responsibility placed on the managements of railroads in authorizing additional main line mileage is far greater than it was a quarter of a century ago and the fact that considerable new mileage is now being undertaken is a definite indication that the outlook of the railroads is much brighter than it has been during the past 10 years.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Carload Shipments of Fruits and Melons from Stations in the United States, compiled by Bur. of Agricultural Economics. For calendar years 1920-23. U. S. Dept. of Agriculture. Stat. Bull. No. 8. 78 p. Pub. by Govt. Print. Off., Washington, D. C. 10 cents.

Carload Shipments of Vegetables from Stations in the United States, compiled by Bur. of Agricultural Economics. For calendar years 1920-23. U. S. Dept. of Agriculture. Stat. Bull. No. 9. 98 p. Pub. by Govt. Print. Off., Washington, D. C. 10 cents.

Crossties and Poles Purchased and Preserved, compiled by U. S. Bur. of the Census, and U. S. Forest Service. For 1923. Gives numbers purchased, and treated, average costs, etc., by railroads and kinds of wood. 11 p. Pub. by Govt. Print. Off., Washington, D. C. 5 cents.

Economic Factors in the Railway Situation, by Bureau of Railway Economics. Report to American Railway Asso. BRE Misc. Series Bulletin No. 37. 14 p. Published by Bureau of Railway Economics, Washington, D. C. Apply.

The Public and Its Utilities, by Wm. G. Raymond. Primarily for use as text-book in colleges. Includes discussions of earnings, operating expenses, depreciation, taxes, rates, and public regulation. 339 p. Pub. by J. Wiley & Sons, New York City. $3.50.

Report of the Car Service Division, American Railway Association, May 15, 1925. 8 p., fold. chart. Pub. by American Railway Association, Chicago, Ill.

Trade Associations—Their Economic Significance and Legal Status, by National Industrial Conference Board, Inc. Chapt. 18, "Establishment of Traffic Bureaus." 388 p. Pub. by Natl. Indus. Conf. Board, Inc., New York City.

Periodical Articles

Efficiency and Wages in the United States, by James J. Davis. Includes mention of employees' investments in railroad stocks; relation of industrial overdevelopment to unemployment, and other related subjects. Monthly Labor Review, May, 1925, p. 1-5.

Motorists and Grade Crossings, by Mills C. Leonard. A Pennsylvania Railroad engineer on motorists as seen from engine cabs. Outlook, May 6, 1925, p. 24-25.

Something New in New England, by Clark Belden. Recent New Haven financing. Barron's, May 25, 1925.

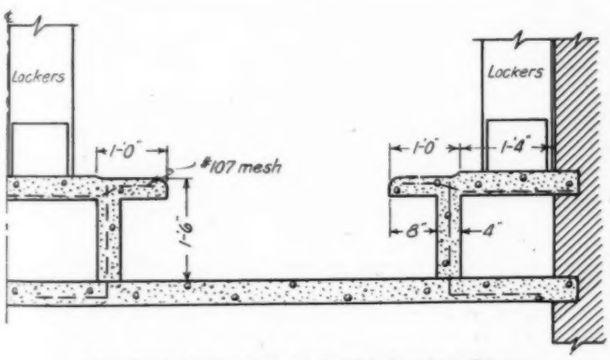
Trend of Occupations in the Population, by M. Z. Jones. Increases or decreases in various occupations, including transportation, by decades, 1850-1920, with discussion of reasons why. Monthly Labor Review, May, 1925.

A Front View of the New Car Shop with the Approach Sheds in the Foreground

Elgin, Joliet & Eastern Builds Half Million Dollar Car Shop

Facilities at Joliet for repairing steel cars distinctive for modern construction and equipment

A STRIKING illustration of the trend away from the familiar practice of providing facilities for repairing cars which are little more than partial shelters during inclement weather, and toward a wider recognition of the economy to be secured from structures which are more comparable in type and equipment to the facilities provided for locomotives, is furnished by a new car



The Seat Construction in the Locker Room

shop which the Elgin, Joliet & Eastern has built at Joliet, Ill., to replace the structure previously destroyed by fire. The new shop differs particularly from its more primitive prototypes in its labor saving features and in the comforts incorporated for workers. But it also lays claim to a certain distinctiveness among recent developments in terminal design by reason of its having been projected by a small railroad.

The E. J. & E. is only about 200 miles long, nearly every point of which lies within an hour's ride of Chicago, but in the business handled and in equipment and terminal facilities it is a road of high order. It extends in a circuitous route from the manufacturing city of Waukegan, Ill., on the shore of Lake Michigan north of Chicago, through Joliet, Ill., on the interior, to South Chicago, Indiana Harbor, Gary and adjacent industrial centers on the lake about an equal distance south of Chicago. It is in reality an outer belt line for this large district, affording interchange with all roads within the area, and provides a direct connection between the interior and the harbors, especially for the coal, oil and metal products required by the several plants of the United States Steel Corporation, of which it is a subsidiary. Among the properties served are the Standard Oil properties at Whiting, Ind.; the Steel Corporation's mills at South Chicago, Joliet and Gary, the American Bridge and the American Sheet and Tin Plate Company's plants at Gary, and the American Steel & Wire Company's mills at Gary and Waukegan, the haulage of ore to Joliet alone last year approximated 1,000,000 tons. For this service the road is double tracked in large part and has unusually large yards, while it has 283 locomotives with 13,000 cars of its own, of which approximately 7,500 are steel.

At Joliet, where the principal terminal is located, the road has long been equipped with excellent facilities for handling and repairing its locomotives but it was not so well equipped for repairing and storing its cars, the facilities for this purpose consisting of a series of frame sheds for the repair of steel cars, together with a wooden car repair shop and a yard of about 10 tracks for storage and light repairs. A new steel car shop had been considered periodically for about 10 years, but little progress was made until March 28, 1923, when a fire entirely destroyed the steel car buildings, except for a few feet of shed over the approach tracks. Since the fire a new structure has been built on the old site, which, while only one item in a program of improvement work including a coal chute, cinder pit and roundhouse at Joliet, as well as work elsewhere involving a total expenditure of $2,600,000, represents an expenditure alone of $500,000.

Building is Conspicuous for Its Roof

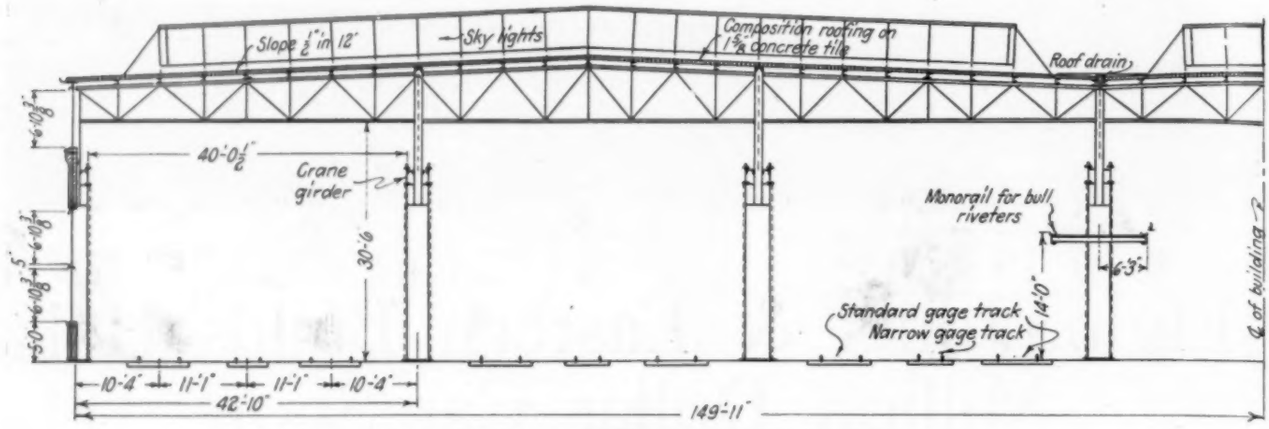
The new building is a brick and steel structure 300 ft. wide across the front and 500 ft. long on one side. Finding it impossible to extend the other side straight back owing to the cramped condition imposed by adjacent

tracks, this wall is broken by two offsets which reduce the width of the building to 171 ft. across the extreme rear end. The building is 34 ft. high at the eaves and from the outside appears to be divided into two longitudinal sections by the slope of the roof, which rises on a ½ in. in 12 in. slope from the eaves on each side to a ridge about 60 ft. from the side wall, from which point the slope is again downward towards the center of the building until it intercepts a third roof section about 42 ft. wide which is also pitched slightly for drainage and extends the length of the building.

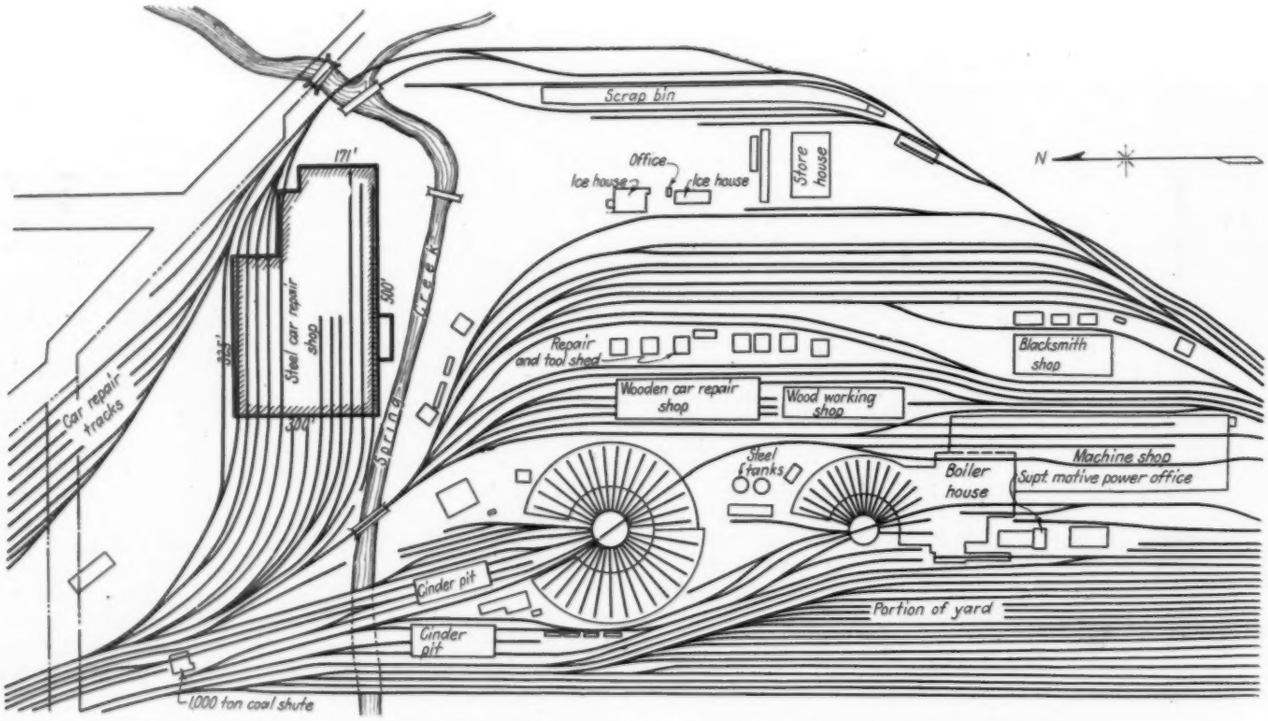
The impression that the building is composed of two main divisions is enhanced by the arrangement of skylights which are conspicuous in all directions. These skylights are of A frame type and occur in three rows down the length of the building, those in the outside rows extending 120 ft. crosswise of the building, about 45 ft. apart and accentuating the appearance of the division of the building by following the pitch of the roof.

In reality, however, no such division is apparent within the structure. The only division results from the presence of six lines of steel columns extending lengthwise of the building. The columns in each line are 25 ft. apart and the lines are spaced on 42 ft. centers, the effect of which is to divide the interior of the building into seven longitudinal bays with no partitions to obstruct the light or prevent ready communication throughout the floor area.

The arrangement of these bays is such as to accommodate 11 standard gage tracks with a total capacity of 85 cars, and six narrow gage tracks. In the first two bays on the north side of the building, which is 325 ft. long, four tracks extend through the building to a ladder at the rear which permits ready connection with the switching and storage tracks in that vicinity. This arrangement also permits the repair of cars in successive



A Cross Sectional View of Half of the Car Shop

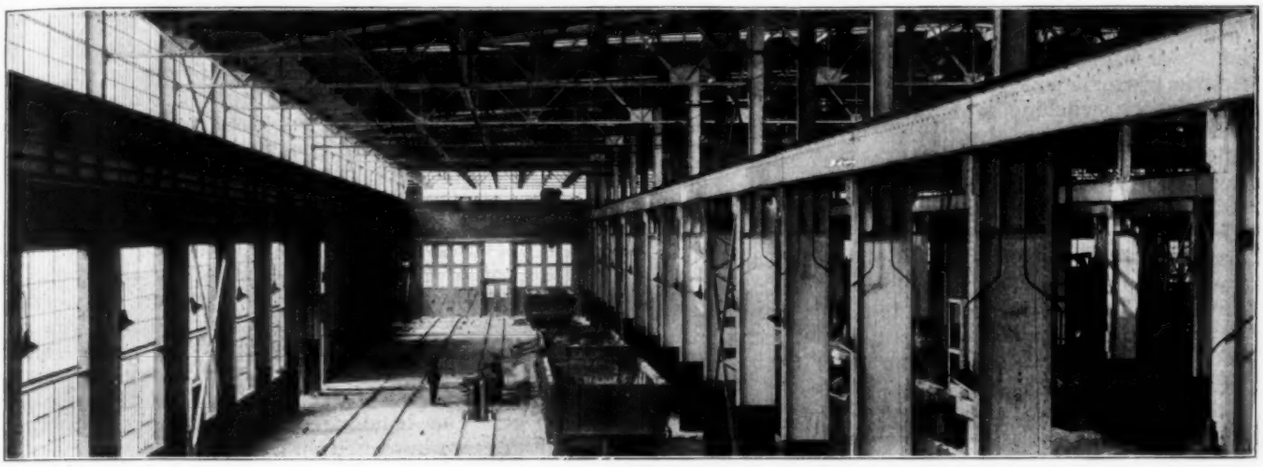


A Portion of the Joliet Yard Showing the Location of the New Steel Car Shop and Track Layout

stages, which has been found to expedite production. The tracks are laid on 20 ft. centers which leaves room for a narrow gage track down the center of each bay between the standard gage tracks. Six-ton traveling cranes operate throughout the length of each bay on craneways carried 25 ft. above the top of rail on steel columns. Between the tracks at intervals of 40 ft. along the floor are two-way air cocks, so arranged as to make it unnecessary to carry air hose across any track.

The third and fourth bays from the north are 125 ft. longer than the first and second bays. There is only one standard gage track in each of these bays which tracks lie next to the tracks just described. These tracks also extend through the building. The remainder of the area in the two bays is devoted chiefly to presses, shears, punches and other car repairing machinery. Narrow gage tracks in this area serve a portion of the standard gage tracks and the machines, and a toolroom is situated in the area in the forward end of the bays next to the front wall of the building. Similarly to the other bays, these two are also equipped with six-ton cranes but in addition the line of columns separating these bays carries runways for a collection of air riveting machines required for side door cars. These runways are supported 6 ft. 3 in. out from the columns on each side and 14 ft. above the floor, each serving five riveters all of which are suspended from the runways by chain blocks.

The other four bays in the building are all 500 ft. long.



Looking West Along the South Bay

In the forward half of the first two bays are four standard gage tracks arranged with a narrow gage track on each side, while the rear half of the area, except for the power plant at the far end is occupied by four heating furnaces, a number of forges and additional machinery, chiefly presses and punches. The furnaces are of the Ferguson type, burning oil. Each of these two bays, like the others, has a six-ton traveling crane and in addition, gib cranes are installed on a number of the columns to serve the big presses and punches in the vicinity. The last two bays of the building are occupied throughout by standard and narrow gage tracks except for the extreme rear end where the shop office is located.

Looking West in One of the Machine Bays

An important feature of the plant, aside from the large number of traveling cranes, riveter runways and gib cranes, is the system of narrow gage tracks laid in the

building. These tracks have already been described as extending between all standard gage tracks and through the machine areas. But the value of these tracks arises chiefly from the fact that they form an integral part of a system which extends all over the yard and also from the installation of two lines of this track crossing the building at the center with turnouts to all longitudinal tracks. This affords a connection between all tracks in the house and facilitates communication with the areas outside the building. All haulage over these tracks is accomplished by electric tractors, which make simple work of any transportation or switching problem which arises.

Special attention is also directed to the facilities which have been provided for the workmen. These include principally a modern wash and locker room which is built adjacent to the south side of the building on the outside. This building is 28 ft. wide and almost 100 ft. long. The first floor is equipped with individual toilets and with washing facilities which include rows of double basins across the building in addition to basins along the wall, all of which are provided with spray faucets, supplied with both hot and cold water, while an upper floor is built for steel lockers and lounging space. There are 506 of these lockers, all installed in transverse tiers on concrete footings which serve also as seats. This building is well-lighted by windows which also provide the desired ventilation and has concrete floors throughout. In addition to this building, two rows of drinking fountains extend through the house at intervals of about 120 ft., and three rows of urinals at intervals of 80 ft., the latter draining into sewer lines which also serve a collection of floor drains well distributed throughout the house.

Another adjunct of the building is an offset 10 ft. wide and 30 ft. long, built in the south wall of the shop for electric welding work, it being the practice to move only the acetylene outfits from point to point in the shop.

Building Erected in Units

The building has walls of wire-cut pressed brick and a composition roof laid on 1⅝ in. concrete tile. This roof is designed for a load of 55 lb. per sq. ft. and as described earlier has a slope of ½ in. in 12 in. All drain water reaching the inner valleys is conducted away by cast iron down spouts which extend to the ground inside the building. In supporting this roof, the span of the trusses was limited to the distance between each line of columns, largely because they permitted the erection of the building in units, thereby allowing the continued use of the site for repairing cars while the building was undergoing erection.

In conformity with the growing practice, the walls of the building are largely taken up by windows. These windows consist of wire glass in copper bearing steel sash. With these windows and the abundance of skylights overhead there is little to be desired in providing light during the day. The electric lighting system is also efficient, including 200-watt bracket lights on each side of every column, overhead lights of 300-watts in each bay and numerous 60-watt drop lights. All wiring for this lighting is carried in conduits and every light is equipped with parabolic reflectors.

No heating facilities are provided in the building except for the office and for washing purposes. The boilers for this purpose, together with other power equipment, including two electrically-driven Sullivan angle compound air compressors and an old Sterling boiler, are enclosed in a room which, as previously described, is situated in the rear of the building. This room includes an overhead platform for the electric transformers and is supplemented by a room provided above the office for preparing all electrical equipment.

Building Erected Without Interrupting Car Work

In view of the immediate need for the shops the construction of this building was carried on without interrupting car repair work. The fire occurred on March 28. By May 8, preliminary plans were completed and by May 22, the expenditure was authorized. In the meantime temporary sheds were built over the machinery which fortunately had not been damaged to any great extent by the fire. As a means of expediting the progress of the work the entire project was then laid out in stages and separate contracts awarded for each class of work. The first contract, for sewers and concrete foundations, was awarded on June 26, three months after the fire. In rapid succession a contract was then let for the structural steel, a third contract for the bridge work, electric lights and floors; a fourth contract for the steel sash and wire glass; a fifth for the roof slabs and finally a sixth contract for the waterproofing required on the roof. All cranes were bought and wired by company forces, which also raised the old tracks the required three feet, relocated and rewired all the machines and painted all the structural steel. On February 20, 1924, the last section of the building was turned over to the mechanical department. This handling of all contracts separately imposed an extra burden from a supervisory standpoint but not only met expectations as a means of expediting the completion of the work, but is said to have reduced materially the cost of erection.

This structure was designed and built under the supervision of A. Montzheimer, chief engineer of the Elgin, Joliet & Eastern, who also supervised the work of installing a 1,000-ton coal chute, cinder pits and roundhouse addition in the Joliet yard at the same time.

THE NEW YORK CENTRAL in an endeavor to avoid the great cost of the electrification of its Putnam division north of the junction with the Yonkers branch as called for by the recent order of the Public Service Commission of New York, has filed a petition with the commission explaining that the development of the internal combustion locomotive makes it possible to eliminate the objectionable features of the steam locomotive and that therefore the requirements of the law can be met at much lower cost than by installing electric power. The order of the commission calls for plans for the installation of electric power to be submitted by July 1 for the whole Putnam division, including the Saw Mill river branch.

Ballybunion Mono-Railway, Ireland, Recently Abandoned

Signals and the Saving of Fuel*

Eliminating one train stop or one delay per trip will not only conserve coal but will considerably reduce cost of operation

By B. J. Schwendt
Superintendent of Signals, New York Central Lines, Columbus, Ohio

ONE year ago at the meeting of this association, R. H. Aishton, president of the A. R. A., established a reputation for "one pound of coal." He suggested that each 1,000 gross ton-miles of freight service could be done with one less pound of coal, such a saving to aggregate a potential value of $3,165,000 in a year's time. The year has elapsed and you have saved over $29,000,000. Mr. Aishton also cautioned against any ideas for fuel saving which might involve large capital expenditures. However, this reservation must give way in the natural march of events if we are to continue to progress and save not only fuel but labor and all that goes with it.

The almost untouched capital advantages of signals and interlocking in the saving of time in train operation is yet to be considered. In such time-saving we automatically save fuel and labor along with many other items, the total money value of which is great enough to justify not only the installation (capital) required but to pay a worth while return on the funds so spent.

Some of the Things Which Make It Possible

In the history of American railroads as a whole the least advancement has been made in the matter of directing train movements. On single track lines and against the current on multiple track lines the trains are generally directed by the written train order system. About four-fifths of the mileage of roads in the United States is single track. By the law of averages, if by nothing else, this advancement and improvement is more than overdue. To safeguard the written train order system, which in itself causes many delays, many roads have superimposed the manual or automatic block signal system. On single track the manual block in particular adds to the complication, delay and expense. One of these block systems, perhaps the automatic, depending upon the nature of the traffic, if properly applied would serve the purpose better.

The proposition is well expressed in the language of Stanton Ennes, formerly general manager of the Baltimore & Ohio, Lines East, who said:†

"Running trains by signal indication instead of train orders, substituting signal indication for the train order, presents the biggest opportunity for reducing costs offered the railroads in years. Few people other than those who have had actual experience in moving trains understand or appreciate the intricacy of train rights and the details of advancing by train order.

"Furthermore, and this does not appear in any record, only the train dispatcher knows how often he lets trains lie at sidings because by the time he could get out the order the train could not clear some superior train at the next siding, when again if it could move without this delay he could advance it at least one siding, often making several hours difference in reaching the distant terminal.

"Neither do any appreciate that these delays are progressive and that the ratio multiplies faster than the traffic. On light lines the necessity for train orders and the number of orders per train are negligible, but as the number of trains increases, the necessity for train orders increases and at an even greater rate, and so rapidly that in many places double track has been imposed long before the volume of traffic justified the expense."

When it is considered that the boiled down result of the written train order system means approximately one of three things to train movement, that is, *Stop, Proceed* or *Head-in,* and that this may be said so easily and safely with signals at the location and time at which action is desired, it is rather singular that the progress of "saying it with signals" is so slow. All the necessary facilities and signals to accomplish the desired result are now in use on railroads and they involve no new or unexplored principles. Many roads are now beginning to avail themselves of the great advantages of signals without written train orders, but the great majority has yet to take hold and develop the thought and the action.

Train Stops and Fuel Loss

In 1913 we made some road tests with regular passenger trains. With the assistance of the traveling fireman we determined that the average of five tests in the stopping of a five-car passenger train (about 300 tons trailing load) required an average of 14 scoops of coal more when making the stop and immediately starting than when running through and not making the stop. The highest speeds involved were 45 miles an hour; with heavier trains or higher speeds, necessarily more fuel would be used. At 20 lb. of fuel per scoop and at $3 per ton for fuel on the tender, the fuel cost alone was 280 lb., or 42 cents per stop. One such stop saved per passenger run of 125 miles, approximately a division, would (based upon 1924 figures for the U. S.) be in proportion to and at the same rate as four pounds of fuel saved for each 1,000 gross ton-miles of freight service. Here are four pounds instead of one, our present goal. Many such stops can be avoided by proper signaling.

According to a report of the Signal Section of the A. R. A., the cost of making a stop with a freight train of 1,610 tons gross weight, involving a loss of about 15 min. would be about $6.25. This is made up of: Locomotive repairs and enginehouse expense, wages of enginemen and trainmen, fuel and other supplies, and car repairs. The fuel item alone is about 72 cents, which at $3 per ton on the tender means 480 lb. of coal. Based upon the average freight train in 1924 for the United States one stop such as this saved per run over the division would save over 2½ lb. of coal per 1,000 gross ton-miles. Here are two and one-half pounds instead of one. From the same report the money value placed upon the train delay hour reclaimed is about $25.

There are many cases on record where automatic block signals alone, without the assistance of other desirable facilities, have increased the average speed of freight trains (not maximum speed) upwards of two miles per

*Abstract of paper presented before the International Railway Fuel Association, Chicago, May 26, 1925.

† Paper presented before Signal Section of A. R. A., March, 1925.

hour by cutting out only the delays. If such an increase is applied to all of the freight trains on Class I roads (average speed during 1924 about 11 miles per hour) it would mean an increase of about 20 per cent which in car supply alone would be the equivalent of 500,000 additional cars. There are many other advantages in addition to the foregoing upon which no money value is being placed by the Signal Section in setting up its $25 figure. I suggest you read the report to get the viewpoint.

Other Fuel Savers

How about the handling of passing track switches by machinery and signals instead of by train crews? This will save about two train stops for each train through such passing track. Two such stops saved in a freight train trip of 125 miles, approximately a division, means a saving, based upon the average United States freight train of 1924, of five more pounds of coal per 1,000 gross ton-miles. Such installations will pay large dividends and if switch tenders are replaced the dividends will be still larger.*

Another item is the arrangement of signals at points where switching is involved. In many places conditions have outgrown themselves. A signal in the right place or the addition of a signal would save a yard engine many hours of useful time (fuel included). The time and fuel saved for other useful work would pay handsome returns on the cost of changing or supplying the signal. There are other similar cases along the main track where a better location might be selected so that trains required to stop by a stop signal can start without difficulty, thereby again saving time and fuel.

There is, also the question of requiring the observation of the flag rule in automatic block signal territory just the same as though no automatic block signals were there. The signals fail the wrong way about one time in upwards of 2,000,000 operations. How often does the flagman fail? A number of roads have already eliminated the unnecessary duplication which kept trains waiting while the flagman returned from a distance. They are saving time, effort and fuel.

It is not always necessary that trains stop at an automatic block signal in the stop position, but it is a matter of discipline to insure low speed through the stop block. Some roads are breaking away from this practice by using what is called the "tonnage signal" which permits tonnage trains to pass the stop signal, without stopping, at a prescribed low speed.

If an interlocking plant is at a crossing or junction, the connecting line may be at fault for indulging in practices which unintentionally cause delays to the other road's trains. I have in mind a case where a connecting line has a water penstock less than a freight train length outside interlocking limits. When one of its trains stops to take water it blocks all three other roads in the plant.

Important Changes That Would Save Fuel

A consideration of the cost of train stops might change the policy of taking certain plants out of service for repairs. A plant out of service for 30 days involving the stopping of 50 trains a day at $5 each means a loss of about $7,500, approximately 15 per cent of which is fuel. Do all understand the necessity of prompt and exact action in furnishing labor and material to prevent such losses? A substitution in material by the uninformed in trying to save a few dollars may result in just such a loss. It may be cheaper to build a new tower than to put up with the increased loss of time caused by an old plant being out of service incident to repairs.

*See *Railway Age* for May 5, 1923, page 1088.

How many interlocking signal stations have you where the operator cannot know at all times just when a train is going to arrive? The signals being normal stop, he cannot clear them prematurely without chancing delay to the other road. A telephone or other means of information would insure that there would be no excuse for unnecessary train stops at such plants.

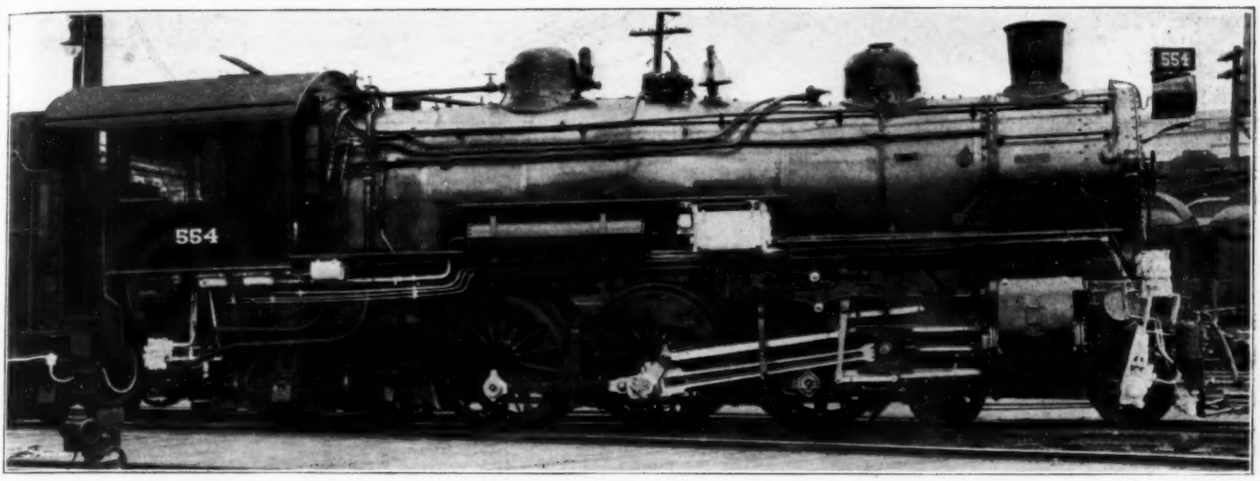
How many interferences do you have between trains or switching movements in your yards and engine terminals where it may take three or four engines in the course of a day to do the work, yet during part of the day only one can work? This is usually caused by an ineffective track layout, or perhaps a routing of superior trains which requires them to pass through this yard or terminal. I have in mind a recent analysis whereby relatively small changes in track layout and signals indicated a saving of 3,000 yard engine hours, 272 freight train hours and 272 yard cut hours per year, and the elimination of three switch tenders. This amounted to upwards of a 50 per cent net return on the cost of making the change. This may not always involve signals but surely will always involve fuel saving.

How many places do you have where under your rules with a two-position manual block signal it is necessary to slow up the train to hand on a caution card to indicate "Caution Block." Why not change the signal to a three-position signal which would avoid writing or handing on a caution card or slowing up the train, thus saving fuel and time by "saying it with the signal." Usually the cost of changing from two to three positions on manual block signals is insignificant.

How many non-interlocked crossings or junctions have you where under the law trains are required to make the safety stop and which stop if avoided by installing proper interlocking or safety device would save upwards of 480 lb. of coal per stop, representing about 15 per cent of the cost of stopping. The annual cost of making these stops is usually great enough to pay all carrying costs of the signals or interlocking plants necessary to avoid the stops and in addition pay a handsome return on the money so spent. I know of cases where the net return on the investment would be over 100 per cent.

There are many improvements in cars, locomotives and track facilities too numerous to mention, yet in general we have the same old system of directing train movements by written train orders dating back almost to the time the telegraph was invented. Permit me to suggest that since the proverbial "one pound of coal" saved has already been more than accomplished that we set a goal of "one train stop or one delay eliminated per trip," continuing this progressively until facilities are installed which will eliminate the last unnecessary train stop or delay. Get rid of these "train crew operated" passing track switches and substitute machines. Get rid of these unnecessary written train orders substituting the fixed signal as many roads have now started doing. Give all of enormous capital investment already made a full opportunity to function by putting in the "keystone"—signals.

THE ELECTRIFIED LINE of the Canadian National from Montreal through the Mount Royal tunnel to Lazard, 7.3 miles, is being extended 9.7 miles further to St. Eustache. The electric line between Montreal and Lazard, which is a direct current trolley, operating at 2400 volts, was completed in May, 1917. Storage battery cars have been running between Montreal and St. Eustache, but with the extension of the trolley, heavier cars can be used which are capable of hauling trailers and better service between the two points is assured.



Typical Locomotive with Train Control Equipment Painted White for Illustration

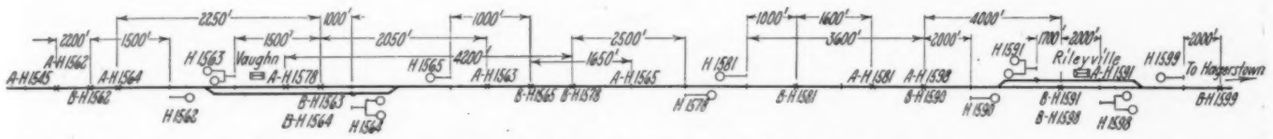
N. & W. Completes Train Control

Continuous system incorporated with a.c. position-light signaling on a division of single track

By D. W. Richards

Signal Engineer, Norfolk & Western, Roanoke, Va.

THE Norfolk & Western has installed the three-speed continuous inductive train control system as made by the Union Switch & Signal Company on its single track division of 108 miles from Hagerstown, Md., to Shenandoah, Va., the installation including a complete new system of automatic block signaling of the a.c. position-light type. This installation was made in compliance with the order No. 13413 of the Interstate Commerce Commission dated June 13, 1922, and construction is now under way to extend the installation from Shenandoah to Roanoke, 132 miles farther, in compliance with the order of January 14, 1924. The installation was commenced in December, 1923, and placed in service on November 10, 1924, with six equipped locomotives. Two additional passenger and 33 freight locomotives, making a total of 41, were put into service February 15, 1925.



Track and Signal Plan Between Sidings, Showing Signals and Location of "A" and "B" Points for Each Signal, in Which Case "A" is the High to Medium Speed Braking Point and "B" is the Medium to Low Speed Braking Point

This district was selected for the istallation of train control because it was not equipped with automatic block signals and it was thought preferable to protect the train movement on this district and also increase the track capacity, rather than to add the train control system to a district already provided with automatic block protection.

A careful study was made in deciding on the train control system to be used, the basic selection being between intermittent and continuous control devices. In the intermittent field there is a choice between ramp and inductive types. It was found that on account of the fundamental requirement the wayside ramp and the train-carried shoe must overlap each other, one or the other must encroach on clearance. Dragging equipment, loose track obstructions, banked snow and ice and even authorized structures, such as station platforms, have little respect for the clearance diagram so that one or both of these essential parts is subject potentially to dangerous derangements. In studying the intermittent system, in comparison with the continuous speed control system, we found that the latter system utilizes the running rails themselves in place of the roadside device and that the engine-carried receiver is well within the clearance lines. It was therefore apparent that there was no encroachment which might render the system inoperative.

Intermittent systems are designed to cause brake applications only at certain control points, usually at fixed signal locations, but always separated by several thousand feet of track in which train control is non-existent. After once passing a clear control point a subsequently developed dangerous condition ahead of a train cannot affect the brakes before reaching at unlimited speed the next control point which will, in most cases, be too late. In continuous control systems such a condition would instantly affect the train control device to apply the brakes, regardless of the location of the train. This is because

the rails themselves, which must be continuous, constitute the roadway element of the system.

There were other desirable features peculiar to the continuous system which also affected our choice, of which the following are a few examples:

Changed conditions calling for a more restricted speed are instantly reflected on a train, and vice versa, changed conditions, favorable for an increase in speed, are also instantly reflected on a train and may be taken advantage of by the engineman. This immediate response to changed conditions was of immense importance to us when it is remembered that we were contemplating the installation of train control on a single track line. Expeditious handling requires that opposing trains approaching a meeting point should not delay each other beyond the requirements of safety. It was found that in the continuous system opposing trains could be advanced much nearer a passing siding than in an intermittent system. To put it another way, in the continuous system, opposing trains could be advanced, until they reached a distance relation to each other dangerous if high speed were continued regardless of their respective relations with the passing siding. On the contrary, with intermittent control the braking must be effected with regard to the passing sidings, even though the trains themselves may be at great distances apart. This would have caused serious delays at meeting points which would have been felt still more when more than two trains were involved in a meet. With the continuous system we could take advantage of the facilities afforded by speed control in which high speed could be permitted under favorable conditions, medium speed in a caution or medium speed block and low speed in an occupied or low speed block.

An all-important consideration in a comparison between systems of train control is safety. The interlocking system in its crude beginning consisted of a grouping of several switch-operating levers at a single location. Such an arrangement was simply a convenience. Experience, probably expensive, taught that signals locking between levers, detector bars and facing point locks were necessary. Further experience showed the desirability of caution distant signals, approach locking, route locking and section locking, all of which additions are solely for safety. Even the signaling aspects have progressed from the crude (and now totally inadequate) early forms, so that modern signaling provides for a variety of indications for the guidance of the engineman in controlling his train. Thus we usually have, among others, indications for high speed and for medium speed; for proceed prepared to stop; for low speed into an obstructed block; and for stop. When confronted by the necessity for a large expenditure for additional train protection, the Norfolk & Western chose the system which, in its judgment, gave the greatest degree of safety and that at little, if any, extra cost over systems installed to meet operating conditions.

The single-track line between Shenandoah and Hagerstown has 22 passing sidings. The maximum curvature is 9 deg. and the maximum grade 2 per cent. Trains were formerly operated under the telegraph block system. In this district, there are two interlocked grade crossings, at Riverton and Charlestown, and numerous highway crossings which had to be protected.

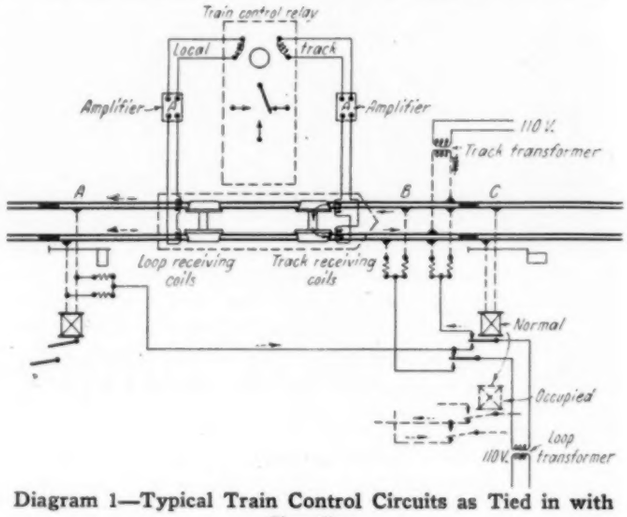
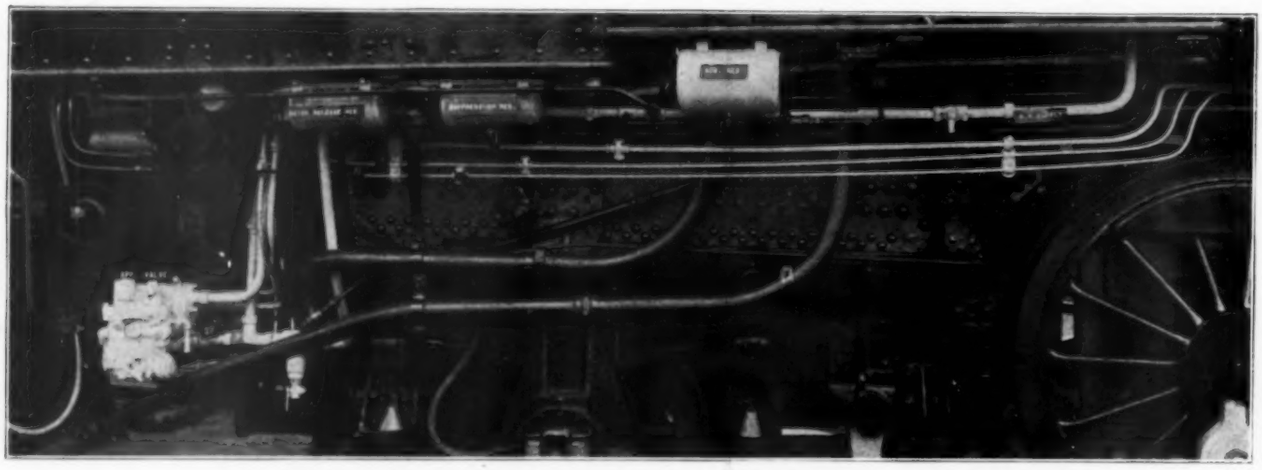


Diagram 1—Typical Train Control Circuits as Tied in with Signaling

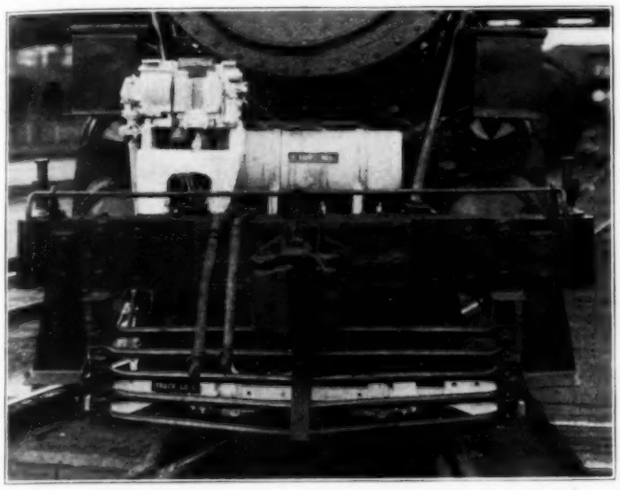
Alternating current track circuits were installed so as to make the automatic signal system immune from the effect of possible d.c. foreign current, and also because the same transmission line could be utilized economically for the operation of water softening plants, automatic electrically driven pumps, station lighting, switch lighting, etc. Current at 4,400 volts, 3-phase, 60-cycle is furnished at three different points, Hagerstown, Berryville, and Shenandoah. The system is so arranged that Berryville will transmit in both directions, to Shenandoah and to Hagerstown, while the substations at the two latter points can transmit to Berryville in case of a power failure there. As an additional precaution the substations at Hagerstown, Berryville and Shenandoah are each supplied from



Application Valve, Quick Release and Acknowledging Reservoirs Under Cab

two or more sources. All the various sources of supply at each station will eventually be arranged so that they can switch in automatically when normal power fails.

The automatic block signal installation consists of 118 ground signals, 41 bracket signals and 282 a.c. track circuits. The Absolute Permissive Block system of signal control circuits is used which provides head-on protection



Front View Showing Governor and Track Coil Supports

from siding to siding, but permits following trains to run one block apart between passing sidings. The photographs show the position-light signals as installed on this district. The signals are designed to use three lights in a row for each indication, the arrangement of lights corresponding to the position of the semaphore type of signal.

Signaling at End of Passing Track

Intermediate Location with Grade Signal

Signal with Lower Arm for Siding Indication

If the horizontal row of lights is lighted the indication is "Stop." If the diagonal row of lights is lighted, the indication is "Proceed under control prepared to stop at next signal." If the vertical row of lights is lighted, the indication is "Proceed."

At interlocking plants and also at some passing sidings two-arm signals are used. The additional indication is provided by two rows of lights fixed 6 ft. below the top signal lights, one row horizontal and the other row inclined at an angle of 45 deg.

The automatic signals are "Stop" and "Proceed," but at various points between Shenandoah and Hagerstown on heavy grades, "grade" indications are provided; a row of three lights inclined at an angle of 45 deg. opposite to the angle used for a two-arm signal, and located on the signal mast 6 ft. below the lights above described, as shown in the illustrations. With the grade indication trains may proceed without stopping, but under full control.

Fixing Speeds and Braking Distances

The addition of train control to our single track automatic block system brought in new problems to be solved. In the first place, it was necessary to choose the high, medium and low speed limits. Because of the curvature and grades encountered, it was decided that 60 miles an hour for passenger trains and 40 miles an hour for freight trains was the safe maximum and would satisfy our traffic conditions. On other divisions where higher speeds are desirable and safe, higher speed limits would be used. Twenty miles an hour was selected as the low speed because it had been found difficult, at lower speed limits, to keep heavy tonnage trains moving without stalling on grades. The medium speed limit was arbitrarily fixed midway between the high and the low.

Having fixed the speed limits, the stopping distances of trains under varying conditions of grade and curvature could be determined; and the signaling was laid out, wherever possible, in accordance with the stopping distance. It must be remembered that an engineman can usually see a restrictive signal before reaching it and, knowing the speed and weight of his train and other conditions affecting stopping distance, perhaps apply the brakes before passing the signal. He also has the option of making an emergency brake application if, in his judgment, the rate of train retardation is not sufficient. A train control system cannot anticipate a caution signal and, as it is not always safe to make a direct emergency application, the automatic application is restricted to the full service.

As the train control system is intended to function if an engineman should become incapacitated, it is necessary to provide adequate stopping distances in the rear of all signals. Since heavy freight trains at their maximum speed require greater distances than passenger trains, stopping distances are calculated for freights, and the signaling was laid out accordingly.

Another consideration in single track signaling is the double stopping distances required where high speed op-

posing trains may approach each other at passing sidings. In studying this phase, it was found that, due to the continuous control system being chosen, neither of such trains would need to affect the other until they were within double stopping distance of each other. This allows the first arrival always to proceed at full speed until within stopping distance of the far end (from him) of the passing siding while the second arrival is allowed to proceed unchecked up to stopping distance from his near end.

Operation of the Continuous System

The roadway portion of the system consists of alternating currents in the rails. One, the usual track current, flows down one rail, through the track relay or the axles of an occupying train and back in the other rail as shown in Diagram 1. Another train control circuit, called the "loop circuit," flows through all or a part of a track circuit through both rails in multiple and returns on a line wire. This latter circuit is polarized, that is, when the next block ahead is clear the current at a given instant will flow through the rails in one direction, but if the next block is occupied, the current at that instant would flow in the opposite direction. The track current flow, Diagram 1, is shown by the solid arrows and the loop current by the dotted arrows. It will be noted that when the next block is occupied the loop current is not only reversed in direction, but also a part of the track, between the *B* point and the stop signal, is deprived entirely of loop current. There are, therefore, three different conditions of loop current relative to the track current; (a) loop current of one relative polarity, (b) loop current of the other relative polarity, and (c) no loop current.

The appearance of the train control devices on the engine is shown in an illustration. The locomotive equipment consists of the track receiver coils between the pilot and the front axle; the speed control valves and centrifuge, above the pilot, driven from the outer end of the front axle; the instrument case just ahead of the main air-reservoir; the brake application valve group below the cab; and the loop receiving coils at the rear of the tender. Diagram 1 includes briefly the electric control elements while Diagram 2 shows this in complete detail.

The alternating currents in the rails generate, by induction, voltages in the receiver coils which are so combined that the track-receiver coils are affected only by the track current flowing in opposite directions in the two rails, while the loop-receiver coils are only affected by the loop current which flows through both rails in the same direction. These voltages are amplified through audion amplifiers and conducted to the train control relay which they operate.

The train-control relay is so designed that when the polarity relation exists, as in approaching a clear block, its contacts are swung to the right, the normal position, as shown in the diagrams. With the polarity relation which exists between *A* and *B* in the rear of an occupied block, the contacts are swung to the left. When the loop circuit is absent, as between *B* and *C*, in the rear of an occupied block or when the track current is absent, as in an occupied block, the relay is de-energized and the contacts are moved by gravity to the middle position. These three relay positions respectively set up the high, medium and low speed limits and illuminate corresponding indications in the cab.

How the Train Control Affects the Air Brakes

The centrifuge, which is driven by the front axle, has several small poppet valves (one opened at each of the speed limits) which, when open, act to initiate a brake application if the speed of the train exceeds the speed limit set up by the train-control relay as determined by conditions in advance. This automatic brake application may, however, be suppressed if the engineman previously makes a proper and sufficient manual application. When he does so he may release the brakes after the train has been retarded to the proper speed.

The automatic brake applications are always split, the first reduction being about 7 lb. to 8 lb., followed, automatically, when this reduction is completed, by a further reduction of about 13 lb. This is an important feature

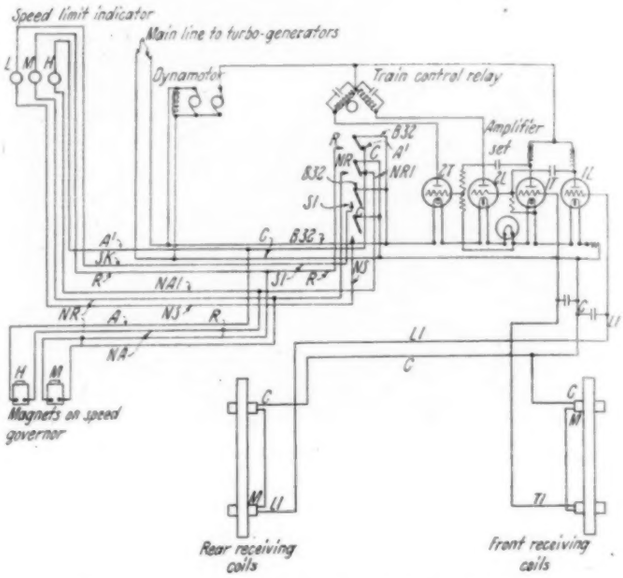


Diagram 2—Locomotive Train Control Circuits

of this system because of the well known smoothness of stops and the absence of destructive shocks throughout the train when the slack is run in too violently, as frequently occurs in a continuous service reduction. When the brakes are applied automatically they cannot be released automatically. It is always necessary for the engineman to lap the brake valve until the proper speed limit is reached. The automatic brake application valve then restores and then, but not until then, the handle can be returned to the running or release position.

Failure of any wire or any part of the apparatus will restrict the train to either medium or low speed. In such an event a sealed cutout cock may be operated, permitting the train to run without train control, but the breaking of the seal will have to be accounted for. The speed limit indicator may still be operative so that the engineman may control the train manually in accordance with the indications.

The work of installing both the automatic signals and the roadway train control apparatus was handled by the signal department forces with the co-operation of the telegraph department and the Shenandoah division officers and organization. The plans were prepared by the signal department in co-operation with the Union Switch & Signal Company's engineers.

This system has given an excellent record of itself since it was placed in service and tuned up. It took some little time to clear up adjustments and minor faults as is always necessary after a large construction job; but since then the performance has been very satisfactory. The record of operation for April shows only 13 failures, 12 of which were engine failures, 3 electrical and 9 pneumatic. As the maintenance men become more familiar with the system, further improvement in operating results will be realized.

Freight Station Officers Meet in Kansas City, Mo.

Subjects considered suggest standardization which will result in more efficient service

THE fifth annual session of the Freight Station Section of the Operating Division of the American Railway Association, which was held in Kansas City, Mo., on May 19-21, was attended by 625 members. The meeting was opened by an address by W. G. Bierd, receiver of the Chicago & Alton. The annual dinner was given at the Elms hotel, Excelsior Springs, Mo., the Wabash providing a special train which transported 500 people to and from Excelsior Springs. Among those who spoke at the dinner were C. W. Miller, president of the Kansas City Traffic Club, and traffic manager of Swift & Company, Kansas City, Mo., C. W. Dooley, traffic manager of Peet Bros. Manufacturing Company, Kansas City, and Charles E. Johnson, vice-president and general manager of the Kansas City Southern.

Officers elected for the ensuing year were, chairman, C. T. Spear, agent of the Chicago, St. Paul, Minneapolis & Omaha, St. Paul, Minn.; first vice-chairman, Frank Laughlin, agent of the Erie, Cleveland, Ohio; and second vice-chairman, C. B. Ingersoll, agent of the Wabash, Chicago. Those elected to the Committee of Direction were F. T. Anderson, agent of the Canadian Pacific, Winnipeg, Man.; B. R. Brenan, agent of the Cleveland, Cincinnati, Chicago & St. Louis, Cleveland, Ohio; W. H. George, agent of the Chicago & Alton, East St. Louis, Ill.; W. H. Herbig, agent of the Chicago, Rock Island & Pacific, Kansas City, Mo.; W. C. McAlister, agent of the New York, New Haven & Hartford, Boston, Mass.; W. Merriman, agent of the Southern Pacific, Oakland, Cal.; and W. V. Phillips, agent of the Pennsylvania, Jersey City, N. J.

Mr. Bierd discussed the pressing necessity railroads always have felt for reducing the outgo to meet the income and stated that all business must give thought to the working back to a more simple order, since at the present time the individual is in danger of becoming intoxicated with his own prosperity. "All business must cut expenses, and reduce extravagances. The present condition cannot last unless this is done as our people cannot live among and off themselves. We must prepare to produce a surplus of goods which can be sold to Europe at a price which it can meet. Europe is slowly recovering from the war and unless we are ready at the time of this recovery with a surplus of goods produced at a price they can meet, we will not be able to dispose of our surplus but will in turn be faced with a flood of their more cheaply produced goods. This will create the danger of a depression in our country within two to five years unless we meet it in the manner stated."

W. B. Kellett, freight claim agent of the Ft. Worth & Denver City, Ft. Worth, Texas, and chairman of the Freight Claim Division of the American Railway Association, spoke on loss and damage, stating that it had been cut $1,277,000 during 1924 although 1923 was considered a banner year in this respect. Over $50,000,000 has been taken from the damage account in four years, all due to more efficient handling of freight. Louis Pilcher, secretary of the Freight Claim Division, reported that between 85 and 90 per cent of all loss and damage claims were disposed of within 90 days. G. W. Crawford, chairman of the General Committee of the Transportation Division of the American Railway Association, addressed the assembly on the subject of increased carloading, promising the aid of his committee in helping agents reach their objective.

E. J. Coffey, agent of the Southern, East St. Louis, and chairman of the Freight Station Section, in his annual report, stated that in the interest of increased efficiency the committee on station rules was abolished and a new committee on freight claim prevention was appointed. Agents will be asked to check tariffs and billing to determine where through billing is not being taken advantage of in cases where two rates are in effect. He impressed the agents with the importance of selling their organizations to themselves and then selling it to their officers. He reported that arrangements had been made for the Freight Station Section to form contracts with each regional advisory board throughout the United States. Agents were asked to study and report their ideas on the matter of simplifying the various tariffs in effect. Sectional committees were reminded that they have authority to include neighboring smaller cities in their membership. During the past year the membership was increased by nine sectional committees and 83 members.

Report of Committee on Operating

In considering claim payments made by carriers for fresh fruits and vegetables, the Committee on Operating suggested that any investigations into claims in 1923 and 1924 or any application of corrective measure that does not begin with the producer and end with the consignee is of little value.

In its investigation, the committee found a lack of uniformity of practice among the carriers in the handling of fresh fruits and vegetables which contributes largely to the unsatisfactory results obtained. There is such a wide difference indicated in handling the various classes of fresh fruits and vegetables that no general instructions as to refrigeration, ventilation, heating, cooling, etc., would be of any value. The territory in which the perishable protective tariff is in effect makes any logical application of it by the average local agent almost impossible. The committee also found that there is no well-defined arrangement covering the interchange of heated cars between carriers; that is, there is usually a lapse between the time the heater of one line is removed and that of another installed, and in most instances lines of final delivery, particularly switching lines, provide no heater service whatever. Loss accruing from this cause is assessed against the carrier delivering the car on account of the delivery line handling the car under carriers' protective service.

The committee recommended (1) that present rules be revised and specific rules be promulgated by the carriers, uniform in character and mandatory with all lines, which shall provide that the service under which the shipment leaves the point of shipment may be maintained to point

of final destination, regardless of reconsignments in transit.

(2) That to as great an extent as is possible specific and definite information should be developed each year through some authoritative agency which will put the carriers in possession of all the facts regarding the field conditions of the several important crops. This is to determine whether the condition of the fruit or vegetables at the time of shipment may set up a chemical action when loaded closely in a car. Such damage is frequently taken for deterioration from natural causes due to transportation failures but is really due to a crop defect present prior to the shipment being delivered to the carrier and one not in any way due to a transportation failure.

(3) That the acceptance for shipment of hampers, baskets and like packages which are known to be improper containers be prohibited; that containers be standardized with a view to carrying the specific commodity for which they are designed and with square ends and sides to admit of proper stowing, bracing and safe carriage to destination.

(4) That the carriers see that the equipment furnished is inspected by competent inspectors and know it to be fit in every way for the safe carriage of the commodity for which it is furnished.

(5) That definite rules be put into effect which will cover the best practice of loading and stowing the various classes of containers. Packages should be loaded solid, lengthwise of the car, with well defined air spaces when needed, also running lengthwise of the car.

(6) That the agent in issuing the bill of lading shall comply with rule No. 80 and amendments thereto of Perishable Protective Tariff No. 2, which requires the shipper to specify the character of protective service, if any, desired. These instructions shall be transcribed on the waybill and shall be specific and in language provided for in Rule 80.

(7) After arrival in the train yard, cars carrying perishable freight should be promptly handled to point of delivery and the service under which the car is moving should be carefully checked each day until delivery is effected, and the conditions of the contract under which the shipment is moving should be carefully carried out.

The committee also recommended that each package or piece be marked with a linen tag securely attached, each tag to show the name of originating road, point of shipment, date of shipment, name of shipper, name of consignee and point of destination. Each tag for each package in each shipment should be numbered consecutively and the numbers shown on waybills and freight bills.

Transit privileges in common with the numerous other exceptions to the general rule which have been forced on the railroads, to meet the insistent and persistent demands of locality interests and competitive necessity, have now reached a point where the committee believes a halt should be called and stock taken of just what the cost of these privileges is to the carrier and what effect it has on commodities not enjoying such preference. A review of the situation as set forth in various tariffs indicates that there is no uniformity among the various carriers and the practice in some cases resembles actual rebate.

Because of the enlargement of these privileges and the unrestricted demands of shippers this cost is steadily increasing and the committee believes (1) That the entire transit situation should be reviewed by some body of competent jurisdiction to the end that the number of commodities on which transit privileges are justified, be brought to a minimum. (2) If found to be justified, that uniform rules be promulgated along the same lines as the national car demurrage rules, and the rules carried in reconsignment and diversion tariffs. (3) That all competitive features be positively removed. (4) That the rates and charges be made with full knowledge of all factors of expense involved in handling the traffic. (5) That all the rates, charges and authorized absorptions be published in the tariff granting the privilege, and that uniform waybilling instructions as finally authorized by the Accounting Officers' Association be a part of the tariff. (6) That not more than three cancellations of inbound tonnage can be surrendered against one outbound car. (7) That no transit privileges be extended to l.c.l. traffic.

Report of Committee on Station Settlements

This committee recommended that authoritative revision of outbound waybills be made to the fullest extent compatible with efficient and economical operation. All inbound waybills should be revised fully for physical correctness, classification, weight, rates, divisions and calculations to permit a proper and correct freight bill being placed in consignee's possession and avoid subsequent adjustments from an accounting department standpoint.

In the event that complete revision cannot be made from an outbound basis, the committee desires that at least waybills carrying advances or prepaid charges must be authoritatively revised, and requests that an investigation be made to ascertain if better results can be accomplished by this recommendation and if concurred in necessary steps be taken with the accounting officers to provide for the necessary adjustment or transfer of forces required to fully comply with the recommendation.

Report of Committee on Freight Claim Prevention

This committee emphasized the need of careful inspection of carload freight to reduce claims. It was recommended that in order that the inspection of carload shipments at destination may be complete and in order to keep this matter of handling carloads at destination before everybody concerned and in order to get all information regarding the handling of this carload freight to enable the agents to put it up to the freight claim agents at the monthly meetings of the Sectional Committee Freight Claim Prevention Committee, a representative of the yard department, yardmaster or assistant yardmaster, a representative of the mechanical department, and representatives of the police departments of the various member lines be asked to attend these meetings so that various methods may be considered and better methods be transmitted to the other sectional committees for their information and guidance. By keeping the matter before those interested the committee believes that an organization can be so perfected that not a single car can go through a terminal in a damaged condition but what someone will make a record and this record will be transmitted to the agent, which will enable him to handle the claim properly by giving his claim agent all of the information regarding the handling.

In considering illegible waybills the committee recommended that when a shipment arrives without a legible waybill at the first terminal a legible waybill be made, checked from the number of packages and the shipment sent forward on the legible waybill to destination. Illegible waybills so caught are to be sent to the secretary of the Terminal Committee to be sent by him to the freight claim agent of the road on which the illegible waybill originated, calling his attention to the dangerous manner in which an agent on his line is allowing shipments to go forward from his station.

To bring about general co-operation the committee suggested that all agents and sectional committees from time

to time make recommendations to their accounting and freight claim officers of changes in classification, particularly changes that would save considerable amounts that are paid out in claims. It also urged agents to persuade the shippers of various commodities to co-operate by giving an improved package, even though the classification does not require it, in order that the roads may have a reasonable chance to deliver it to the customer in good condition. It was also suggested that associations of commerce, commercial clubs and traffic clubs be utilized to urge shippers to co-operate. It was further suggested that when it becomes necessary to call on a firm in a terminal concerning shipments, that a committee of the Sectional Committee be appointed to call on the man and solicit his co-operation so that he may know that it is not one road only asking for his co-operation, but all roads in the terminal.

It was recommended that due to the fact that it is impossible for all agents to devote a sufficient time to the large number of circulars covering the handling in various field diseases of fruits and vegetables and since it is a question of inspection at point of origin and destination and that this inspection should be made both at point of origin and destination, the work be done by experienced and trained men. It was further recommended that this inspection be handled uniformly in every terminal and under the supervision of one department. Even though the men are trained and employed by individual lines, the inspections on one line where the inspector may have more experience might be more rigid than the inspections on the other lines in the same terminal. Shippers and consignees would favor the road that had the inspector with the least knowledge and experience and the one that would enable them to get by with their claims against the road and avoid those that had the most experienced inspectors and those who would prevent claims.

Report of Committee on Topics

In considering the handling of shipments consigned straight to one party with instructions to notify or advise another party at the same destination, the Committee on Topics reported having experienced some difficulty in delivery and diversion of "advise" shipments, and in some instances deliveries have been made to, or diversion orders accepted from the firm or person to be notified or advised, without requiring surrender of the shipper's written order. The committee was inclined to believe that some of these errors have been made because of the similarity in the billing of "advise" and "care" shipments. In order to clarify existing instructions covering the subject, it was suggested that a circular be issued by the accounting departments of the carriers which would include specific instructions covering delivery or diversion of shipments consigned, such instructions to cover (1) shipper's order notify, (2) consigned open to one party, with instructions to notify or advise another part at same destination and (3) consigned to one party, care of another party, at the same destination.

The practice of billing cars, "Deliver only on written order of one party, advise another party," was considered a growing evil on certain commodities and in certain communities. It was recommended that the Freight Station Section go on record as being opposed to the use of any bill of lading other than the order bill of lading for collection purposes, and that the carriers' tariffs be corrected accordingly.

In view of the fact that carriers have suffered heavy losses from shipments billed to one consignee to notify or advise another, the committee requested that a determined effort be made to prohibit the negotiation of written or telegraphic orders as a substitute for uniform orders, bills of lading. If impracticable, it was suggested that an effort be made to have all laws, rules, regulations and tariff provisions applicable to "order" or "order notify" shipments apply with equal force to open advise shipments and an additional charge be assessed for the extra and hazardous service performed. The recommendations resulted from a noticeable increase in the number of shipments, both carload and less-than-carload, consigned to one party, with instructions to notify or advise another party. Such shipments are covered by straight bills of lading and as they are not billed to "order," "shipper's order," or "order notify," they are regarded as "straight" or "open" shipments and are delivered to the "advise" party upon surrender of an order signed by consignee.

In order to decrease undercharges and overcharges it was suggested that a campaign be inaugurated through get-together meetings with the shippers and through circular letters appealing to the consignee's honor and justness in such matters. Some of the contributing causes for undercharges and overcharges are the failure on the part of the proper department promptly to supply all agents and others interested with copies of tariffs, classifications and supplements thereto; the failure of agents, or their subordinates, properly to file such tariffs and supplements; the improper interpretation of tariffs and classifications; errors in extension; the dropping of advance charges; too much abbreviation in billing, making it difficult for the delivering agent to know what the freight is, unless he actually sees it; and the use of improper weights.

The topic "Better loading and bracing of carload freight" suggested that all the detail inspections which are being made by the various bureau agents around stations with a casual glance at carload freight occasionally be abolished and all forces concentrated for several months towards the inspecting, loading and bracing of carload shipments at point of origin. Inasmuch as the average bureau inspector is not properly qualified as a technical engineer, it was thought advisable to recommend that this work be placed under the direction of Colonel Dunn and also that the subject be made a nation-wide campaign.

Annual Meeting of the U. S. Chamber of Commerce

WASHINGTON, D. C.

THE following resolution was adopted by the Chamber of Commerce of the United States at its annual meeting in Washington last week:

The Transportation Act of 1920 expressly provides for the preservation of our transportation systems in full vigor. Proposed amendatory legislative action creates uncertainty in the public mind, tends to retard business, and thus interferes with the growth and development of our transportation systems. If our transportation systems are to be improved and extended to meet the constantly growing needs of commerce, the regulation of our common carriers must be vested in a properly constituted administrative body. The record of the Interstate Commerce Commission is such as to commend that body as the proper agency through which all laws governing the common carriers should be administered.

This resolution represented the only result, after the action of the resolutions committee, of the strong effort made by the Chicago Association of Commerce and a large number of other organizations to have the Chamber place itself strongly on record as opposed to "political rate-making."

However, the following resolution, favoring amend-

ment to the act relating to regulation of motor traffic, was also adopted:

The Chamber recommends that the Congress should amend the Transportation Act so as to embrace motor common carriers engaged in interstate commerce.

The position of the Chamber as to waterways was expressed in the following resolution:

By resolutions heretofore adopted the Chamber has urged upon the Congress the necessity of developing our waterways and water resources. The Chamber has suggested that a compresensive survey and report on the subject be made. The last Congress took steps in that direction by adopting a resolution directing the Corps of Engineers and the Power Commission to make certain surveys and submit estimates of costs.

The Chamber commends the action of the Congress in that behalf and expresses the hope that the work delegated by the resolution may be increased and extended by the incoming Congress and a comprehensive general plan embracing all of the water resources of the country be submitted at the earliest possible moment and before any further action is taken by Congress contemplating performance of work on any new projects, not heretofore undertaken, for the improvement or development of rivers, harbors and waterways.

Resolutions reaffirming the chamber's support of the principle of railroad consolidation and giving the President of the Chamber authority to state its position with reference to possible consolidation legislation at the next session of Congress were approved by the Transportation Group. The same resolution reiterated the principle that full public investigation of the merits of every railroad labor dispute should be made before the interruption of transportation is attempted.

A better public understanding of the problems and difficulties of the railroads has come about in the United States in the last few years, said Carl R. Gray, president of the Union Pacific, in an address before the Transportation Group session. Mr. Gray said that this condition had been brought about largely through the consistent efforts of railroad officers to secure a better understanding of their problems through public speeches, statements and advertisements. A concrete result of this changed public attitude toward the railroads, he said, is demonstrated by the fact that although this year has seen sessions of the legislatures in nearly all the states, practically no legislation distinctly or specifically unfriendly to the railroads has been passed.

Reference was made by Mr. Gray to the whole-hearted co-operation of the Shippers' Regional Advisory Boards, organized in all parts of the country, in helping to solve transportation problems, many of which heretofore have been considered impossible of solution. These boards are composed of representatives of shippers, state commissions, and traffic managers of chambers of commerce.

Mr. Gray emphasized the progress that has been made by American railroads through co-operative effort in fully anticipating and fully meeting transportation requirements, especially in the peak movements of the fall, without material delay, car shortage, or congestion. Despite the fact, he said, that in 11 of the 13 weeks from August 24 to November 22, 1924, more than one million cars were loaded each week, there was in the same period a surplus of freight cars which ranged between 100,000 and 250,000 as well as a surplus reserve of locomotives running from 5,000 to 7,000.

Governmental regulation of buses and trucks as common carriers was advocated before the Transportation Group by T. R. Dahl, of Cleveland, O., speaking for the automotive interests, and John E. Benton, of Washington, D. C., representing the National Association of Railway and Utility Commissioners, who expressed the view that state commissions should be the active regulatory agencies. Suggestion was made that Congress authorize the Interstate Commerce Commission to delegate power to grant certificates of convenience and necessity to the state commission and also act as an appeal body in case of dispute. In a general way, such a plan was said to be satisfactory to the steam and electric railway interests. They were represented at the meeting, but did not participate actively in the discussion.

Simple fairness demanded that common carrier motors be placed on the same regulatory basis as other common carriers, Mr. Benton said.

The speakers expressed divergent views regarding the effect of motor busses and trucks on steam and electric railways. Mr. Benton insisted that busses were imperiling the lives of many electric and steam lines. Dahl responded that the private automobile and not the bus had hurt electric lines principally, and that trucks had added materially to steam line freight business.

William M. Jardine, secretary of agriculture, in an address said:

"One specific way in which cooperation can be given to the farmer today is in connection with the freight rate problem. A careful study should be made of the whole freight rate structure. On the basis of such a study it should be possible, in adjusting freight rates, to take into account both the market value of farm products as reflected over a reasonable period of years, and the influence inevitably exerted by freight rates over the economic development of particular regions and of the country as a whole. I realize that the cost to carriers must be fully reckoned with as a factor in rate making, but I am convinced that it is equally important to consider the value of the service to the shipper. It is not my idea that freight rates should be continually changed to meet fluctuations in market prices. What we must do is iron out present inequalities in the freight rate structure and work out a policy whereby readjustments can be made in the levels of freight rates to meet the changes that occur in economic conditions over considerable periods of time."

Paul Shoup, vice-president of the Southern Pacific, was elected a vice-president of the national chamber for the western division.

BETWEEN Washington and Atlanta, 637 miles, on the Southern, two locomotives are used instead of four, changes being made at Spencer, N. C., the changes formerly made at Monroe, Va., and Greenville, S. C., being eliminated.

Underwood & Underwood

Celebration at Freeport, L. I., of Beginning of Electric Train Service Between New York and Babylon

Development Officers Meet at San Antonio

Several members emphasize necessity of telling railway achievements to public

THE problems faced by railway development officers and their opportunities for increasing traffic while cementing the friendly relations of the railways with their patrons were discussed at length by the members of the American Railway Development Association at their seventeenth annual meeting at San Antonio, Texas, on May 13-15. J. F. Jackson, president of the association, and general agricultural agent of the Central of Georgia, presided at the general sessions and at the banquet on Thursday night, May 14.

A. Leckie, industrial agent of the Kansas City Southern, at Kansas City, Mo., was elected president for the ensuing year, and W. W. H. Hill, general agricultural agent, New York Central, Chicago, first vice-president. A. L. Moorshead, industrial engineer, Erie, New York, was re-elected secretary-treasurer, to serve until the semi-annual meeting in Chicago next December, the constitution of the association having been changed to provide for the election of the secretary-treasurer at the semi-annual meeting instead of at the annual one.

A large number of papers on agriculture, colonization, industrial development and public relations were read at the general and sections meetings. The speakers included not only the railway development officers but representatives of educational, industrial and other interests of Texas. L. W. Baldwin, president of the Missouri Pacific, spoke during the morning session on Thursday.

Dr. W. B. Bizzell, president of the Agricultural and Mechanical College of Texas, in discussing the relationship of agricultural colleges to railroad development, urged closer co-operation between colleges and the railways in the development of natural resources. Admitting that colleges are inclined, as a rule, to pursue their work alone, he declared that co-operation is the only basis of efficient service. Dr. Bizzell praised the work of the development association in creating a more friendly sentiment toward the railways among their patrons. "The work of railway development," he said, "has done more to change sentiment in favor of the railways than any other force in the country."

Railway Development and Traffic

Z. G. Hopkins, manager of the department of public relations of the Missouri-Kansas-Texas, discussed public relations. He took the position that railroads and railroad men generally have been poor salesmen insofar as they have permitted so large a portion of the public to complain against railroad management and railroad service in the belief that many things are true which in fact are wholly false. He declared that railroad men too generally are lacking in understanding and appreciation of the efficiency of American railroads and the splendid service that they perform and of the relatively low compensation railroads receive. His conclusion was that the public lacks appreciation of the railroads largely because so many railroad men have been either apologetic or silent when they were justified by the facts to be aggressive and, to a degree, boastful concerning the efficiency and honesty of the industry with which they are identified.

A paper on the value of the activities of railway development men with marketing organizations was read by W. H. Hill, general agricultural agent of the New York Central lines. Mr. Hill said in part:

"The railway development man, whether he represents the industrial or agricultural phase of development work, is primarily interested in two major ideas; namely, the promotion of traffic-producing lands, or industries, or the maintaining or increasing of the productivity of those lands, or industries already in the hands of producers in his territory.

"The successful agricultural development man has in mind a vision of his particular territory. If his territory is but partially developed, he is looking into the future with a clear-cut plan, the details of which will bring to his railroad a diversified traffic. This should be well distributed throughout the year. He will also have in mind a program so designed that if his leadership is followed, the fertility of the old and the new producing areas will be maintained.

"This being true, the railway development man's basic problem is production—efficient production—of agricultural products.

"One general principle has been overlooked in the attempt to apply the principles of production and distribution, found successful in other industries, to agriculture. That was that years were spent in developing the long line of intermediate agencies existent between the producer and the consumer.

"The railroad development man thinks not alone of a particular producing area, or of one major community, or one community. His vision is not the horizon of one town. He thinks in terms of soils, fertility, people, farmers, production in all its phases and ramifications, the quality of the product produced, standardization, grading, packing, shipment, the market, and finally of the distribution of the commodities to a satisfied customer-group.

"In most of our country the means of distribution of farm products have been laboriously developed with many heartaches and much financial stress and strain. The machinery for handling farm products has served perhaps not always wisely or well, but neither will a new order always serve wisely and well.

"The greatest value of the activities of the railroad development man with marketing organizations lies in his ability to direct and secure a following in behalf of the major problems of agricultural production, and the application of principles which will eventually alleviate the trials and tribulations of co-operative marketing.

"The spirit of community and inter-community development is one of the great problems of the railroad development man. He wants a spirit of friendliness for his road in particular, and all roads in general. Public relations we call it. If we can develop the spirit that his road is a friendly corporation with a vital interest in all agricultural problems; that his corporation is not alone capital and material, but one of men with souls, he will have accomplished far more for his road, its patrons and his country than he will have if he sacrifices all on the altar of

chance in a new idea. He will have secured the greatest value of service. He will have served the co-operative movement in the most successful manner possible."

Development Has Marked Effect on Railway Income

Val. Kuska, colonization agent of the Chicago, Burlington & Quincy, discussed the effect of colonization and development on general railway income. He said in part:

"There is a great variance in opinion relative to the settler's value to the railroad in dollars and cents, as there is no set rule that one can follow in estimating the amount of revenue derived directly from a settler's effort. This in a measure is due to the fact that revenue depends upon the energy and determination of the particular settlers and also the kind of crops or products that he has to sell. Some railroads use as a basis an estimate of the freight and passenger revenue derived and compute the average on the number of settlers in a farm locality.

"The Department of Colonization and Development on the Canadian Pacific has the following to say in that respect in speaking of the value of a settler:

" 'There is one point in connection with the matter which must not be lost sight of, and it is that a settler is worth to Canadian railways much more in the way of furnishing traffic than he individually contributes. In other words, there should be credited to settlers in the three western provinces practically the total revenue traffic of the railroad, for if there were no settlers, there would be no railways or traffic. While it is true that the settlers furnish directly only a portion of the passenger and freight traffic, they should be credited with practically the whole, since without them there would be none.

" 'Assuming, therefore, that all traffic should be credited to the settler, the sum is the average amount each farmer put into the revenue of the railroad (in one case) $746.33, capitalized at 5½ per cent, being interest the government is paying on its Victory Bonds, which gives a return of $13,569.63—the gross value of each farmer to the railroads.

" 'But while it may be true that the value of the farmer to the country may be this amount, it does not indicate the value of the farmer to the railroad because it does not take into account the railroad's cost or show the railroad's profit, the $746.33 just showing the total earnings per farmer. If we take the gross from the net income for the years 1916 to 1920 inclusive, we find that the percentage of net income was 23.8 per cent—$177.62 per annum on each farmer. This amount capitalized at 6 per cent shows the value $2,960.44.'

"Mr. Hunter, general agent of the Chicago, Milwaukee & St. Paul, estimates the average settler in North Dakota is good for $250 worth of new business and in Montana and farther west he is worth $350. The colonization department of the Santa Fe estimates that each producing settler is worth approximately $500 to the railroad each year. W. H. Olin, supervisor of agriculture, D. & R. G. W., estimates about $700 to $900 per year to be the value of a settler to the line.

"E. C. Leedy, agricultural development agent of the Great Northern, has given me some figures on the increase in tonnage revenue in some of their western territory. At Malaga, Wash., for the period from 1902 to 1924, the increase in freight shipped out was 7,136,400 lb., and in freight received, 3,242,350 lb. The increase in passenger revenue was $131.09. The increase in total revenue for the same period was $69,966.23. At Cashmere, Wash., the increase in freight shipped out was 86,146,910 lb., and in freight received, 21,766,292 lb. The increase in passenger revenue was $14,551.56 and the increase in total revenue for the same period, $750,863.18. At Dryden, Wash., the increase in freight shipped out for the period from 1910 to 1924 was 24,806,200 lb. and in freight received, 7,496,290 lb., and the increase on passenger revenue was $1,333.47. The increase in total revenue for the same period was $210,694.19."

L. W. Baldwin Speaks on Development

The importance of the work of the development officer in bettering his railway's relations with its patrons was stressed by L. W. Baldwin, president of the Missouri Pacific. An abstract of Mr. Baldwin's address follows.

"You gentlemen not only have the opportunity, but it is your duty to find out what territory is suitable for various industries and where there is need for such industries, and then get the people to locate there. Much, of necessity, has to be taken into consideration—availability of raw products, labor, market for products. As you handle these people, so their opinion and procedure is determined. You have much to do towards making them friends, indifferent to, or enemies, not only of the railroad with which you are connected, but railroads generally. You have much to do in moulding public opinion.

"Likewise, you have as your mission knowing the various soils and climates, that you may interest people in various sections to grow crops that are productive and profitable. You have to be acquainted with various plant diseases, and their care. Then you must be interested in and capable of knowing that such people are assisted where necessary in marketing their crop. Then you should keep up your contacts that you may be helpful in knowing that such industries and planters, or farmers, have real service,—the kind of service that interests them in further development and that gives them satisfaction that they have the knowledge of being safe in their investment and enterprise.

"Frequently it is your opportunity to help the manufacturer, the planter, the farmer, by advising them of the production of commodities needed by them at locations closer to them, thereby enabling them to lessen their costs, making them more prosperous, or enabling them to sell their products cheaper, or both. Is this not real service?

"If any of us are working on the basis of selling the long haul to the detriment of agriculture or industry, we are working along the wrong lines. We must work for and encourage production in every possible manner along the most economic lines, because first, it is right; and second because we cannot hope to prosper unless the communities we serve prosper.

"Another way you and all of us in this enterprise can be of real service is by knowing the facts about the railroads—your railroad and railroads in general—that they may be put before the public at all suitable times and that they may be told to individuals at every opportunity.

"We all know and appreciate a better understanding between the public and the railroads. Why is this? First, because the facts about the railroads are being frequently told. Second, because we are performing service.

"There is a general tendency to level freight rates, nearly always resulting in a decrease in revenue. This must be avoided as railroads are not now receiving rates which will justify them to continue to expand and develop at the speed necessary to continue to serve the public adequately. The facts in necessary detail should be known by each of us that we can use them where advantageous. We do not want to be a favored class, but we want justice, and each of us is anxious to develop our properties so as to always be in a position to produce dependable and adequate service.

"The greatest prosperity comes to people in general of necessity when railroads are prosperous. The reason for this is manifest because of the number of people directly employed by the railroads, and the number employed in

industries dependent upon the railroads for business.

"I wonder how many of you know that one of the greatest reasons for the great surplus of money in this country—which makes possible cheaper money—is the better service the railroads are rendering. Excess stocks are eliminated, and in the manufacturing industry alone I am told that the investment in stocks of materials has been reduced over a billion dollars. Is this not something to be proud of and something we should be anxious to talk about?

"You have every reason to be proud of the performance of railroads during the past few years. There never has been a time when the railroads were more economically and efficiently operated. During the past two years there has been no falter. In 1923 they handled the biggest traffic; in October, 1924, the greatest traffic of any one month, both without shortage of equipment. You can be of material help in getting tonnage distributed so as to avoid peak periods and I hope you will study this situation to that end."

Storage Battery Locomotives for Northern Pacific

THE Northen Pacific has recently placed in service two of the largest storage battery locomotives that have ever been built. The locomotives are for heavy duty on the Yellowstone division and will be operated by Foley Brothers, who have the contract for coal production in the Rosebud fields recently opened at Coalstrip, Montana. The storage batteries are the largest ever made by the General Electric Company, builders of the locomotives; they are the same type as those perfected for submarines service during the war.

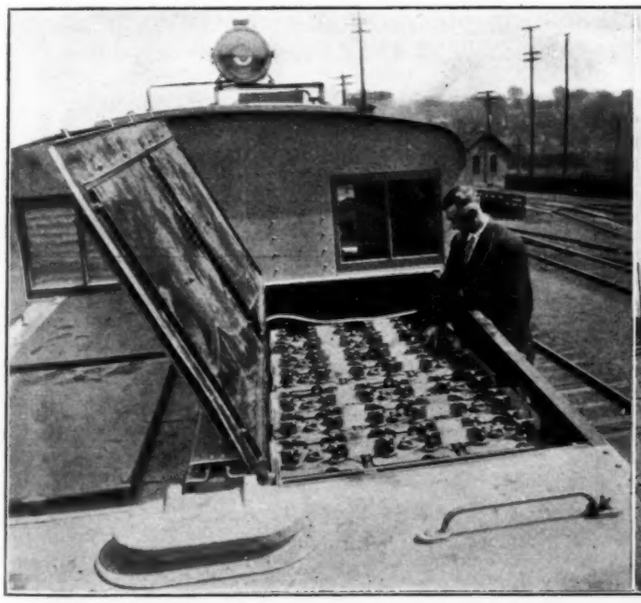
Before the decision was made to use the storage battery locomotives, careful investigation was made of capital and operating costs of steam locomotives, Diesel-electric locomotives, gas-electric locomotives, electric locomotives operated by trolley and third rail and storage battery locomotives. Electric power was already available from the Montana Power Company, but the operating conditions presented difficulties for the employment of either trolley or third rail electric locomotives. Having electric power available at low cost, made it uneconomical to attempt to generate power by oil or gasoline and for these reasons the storage battery locomotive was chosen.

Unusual operation conditions make it necessary to charge the battery while the locomotives are in service and in order to accomplish this a plan was worked out, which is claimed to be the first of the kind ever developed. A motor-generator set, located on the locomotive is operated by means of a flexible cable during the period that the locomotives are spotting cars at the coal loading shovel. This operation requires about 1½ hr. which is long enough to change the battery with as much energy as is used in making a round trip of three miles to the storage yard, with 10 loaded cars of 50 tons each and returning with the corresponding number of empty cars.

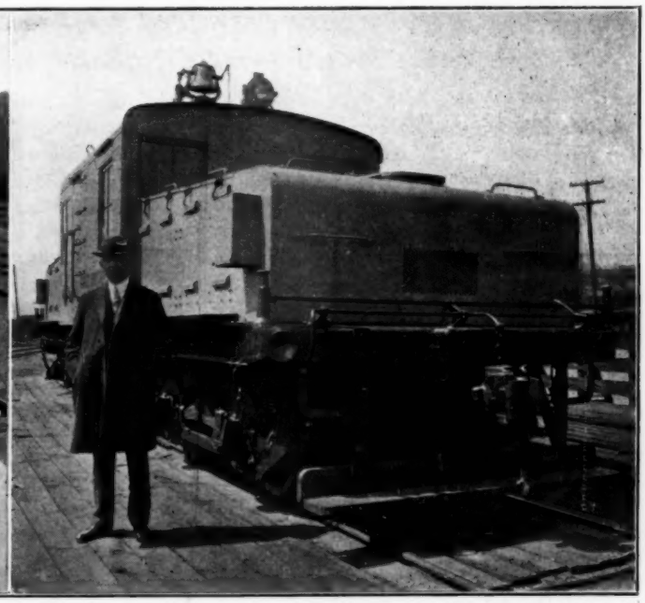
One end of the charging cable is connected to a set of transformers placed on a coal loading shovel where the voltage has stepped down from 2200 to 400. The remainder of the cable is wound on a reel mounted on a small trailer car. This reel automatically winds and unwinds as the locomotive is moved forward or backward.

DESCRIPTIVE DATA

Weight of locomotive	70 tons
Length inside coupler knuckles	42 feet
Number of motors	4
Type of motors	250 volt, single geared, enclosed commutating pole, railway motors.
Weight per driving axle	35,000 lb.
Storage battery, Exide Ironclad	90 cells, F. L.—21
Weight of battery	17 tons
Tractive effort	42,000 lb. at 30 per cent adhesion



One of the Battery Units of the New Northern Pacific Storage Battery Locomotives



Exterior View of One of the Locomotives, H. E. Stevens, Chief Engineer of the Road in the Foreground

A GERMAN FIRM has secured a contract for 21 locomotives for the South African Railways priced between £6,000 and £7,000 each, which is about two-thirds of the English price. This firm is the Maffei Works of Munich. Another concern in Upper Silesia is negotiating for an order for 80 passenger cars for South Africa at prices about half those of the English tender.

A Supply Train on the Union Pacific

Service and Reclamation Fostered by Union Pacific Stores

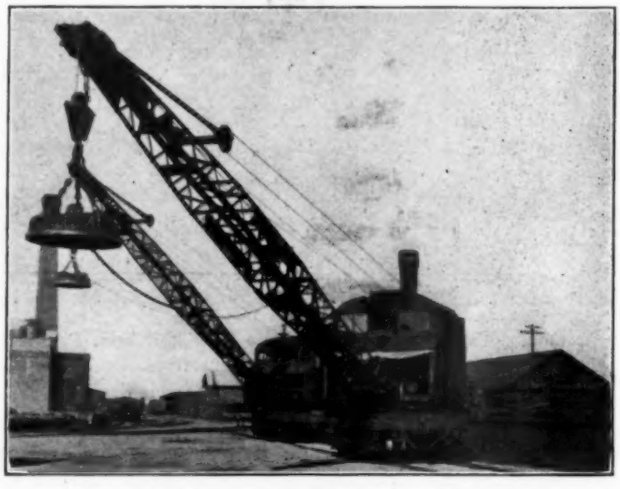
Interest of large scale operations of reorganized system are advanced by liberal use of mechanical aids, charts and conferences

[*This is the last of three articles devoted to a study of the purchasing and stores organization of the Union Pacific. The first article, dealing with the centralization of control, the method of handling forest products and with the system of stock keeping employed, etc., was published in the Railway Age of May 9, page* 1146. *The second article describing this road's system of unit piling, the sectional plan of storehouse operation and its progress in standardization, etc., was published in the issue of May 16, page* 1205.—*Editor.*]

THE two preceding articles describing the Union Pacific's purchasing and stores organization have pictured it strictly as an agency of *supply,* whose function is to have supplies on hand in the proper quantity, and of the proper kind and in a place convenient for all contingencies, and whose responsibility to the management is one of conducting its operations economically and in such a way as to keep the investment in stock down to a minimum consistent with the needs of the road. The further conception of a store as a dispenser of *service,* as well as of bolts, nuts and washers, has not been overlooked on the Union Pacific. In general, two classes of work are performed by the stores organization which are predominantly service in character. One is that service of delivering material over the line for filling the requirements of stations, section forces, extra gangs, etc.

Supply Trains for Line Material

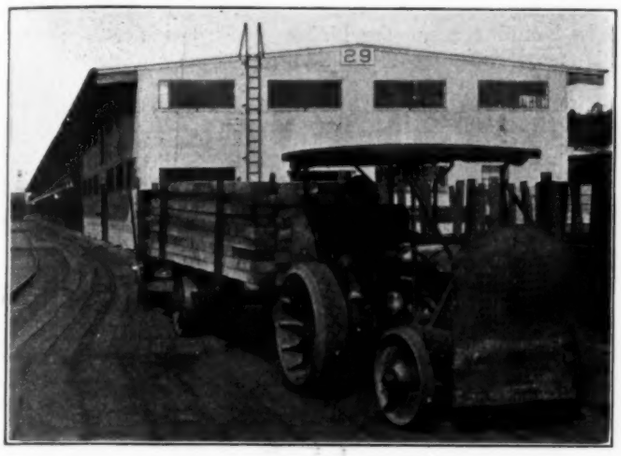
The method of accomplishing line delivery of stores in the western territory are three in number, one, to fill individual requisitions as they arrive; another, to operate supply cars over the line by local freight train, and a third to operate supply trains. On the Union Pacific the first method is judged impractical, on the grounds that it subjects the service of supply to all the uncertainties and cost incident to handling the transportation of small lots of various materials through a variety of agencies, and constitutes a burden on the transportation service by the mingling of some of the material with revenue freight, to say nothing of the difficulties that are present where the ultimate distribution of the material requires the service of the freight agent. The second method has been tried on the Union Pacific and



The Locomotive Cranes at Cheyenne, Wyo., Are Typical of Those Elsewhere on the System

discarded, particularly because of the delays to the service and the difficulty of close supervision attendant upon efforts to coordinate this service with the movements of regular freight trains in a territory as extensive as that on the Union Pacific. The third method has proved a highly satisfactory solution of the problem to the management from all standpoints and is the practice which is followed exclusively on the system at the present time.

Briefly, the practice is to equip a train fully with all



The Type of Tractors and Trailers That Handle Lumber at the Portland Gateway

articles needed to fill requisitions for oil and other supplies for all requirements on the line, together with a full equipment of cars to pick up all scrap not otherwise collected and to operate these trains only during the day time on a predetermined and announced schedule over the assigned territory once every 30 days. These trains are accompanied by the division officers, as well as store department representatives, which permits of withholding the delivery of any materials until a check has been made at the point of consumption to determine the necessity for such materials by the proper supervising officer and to insure an exchange for all tools, etc., which are to be replaced. With the division officers present, the supply train obviously affords the means of a thorough inspection monthly of the entire division under conditions where all arguments can be settled immediately and action taken to improve conditions without lengthy correspondence, delays or misunderstandings. Principal among the other advantages claimed from the operation of trains are the following:

(1) A minimum investment in material, as all parties concerned know that on a certain day each month their stock will be replenished.

(2) The elimination of delays to freight trains and the handling of supplies by regular train crews.

(3) The elimination of the necessity for wrapping, packing, tagging and marking material that is required wherever materials are not delivered directly from a train to users.

(4) The elimination of bulk shipments by baggage.

(5) The elimination of all handling of company materials through congested terminals with its attendant burden on switching service.

In addition, these trains bring back all scrap and serviceable material promptly to a central point, allowing the selling of the scrap quickly and the prompt reimbursement of the money so represented. It also permits the immediate repair of usable materials and their return to stock, thus preventing the purchase of new material unnecessarily.

In the equipment of these trains numerous distinctive features have been adopted with which to expedite the service and bring about economies in other ways, notably the use of an air-operated unloading device on the oil tank cars manipulated by compressed air from the train line, which obviates the necessity of making valve connections at the bottom of the tank preparatory to oil distribution and, by affording other advantages in operation, reduces the usual time of unloading cars at least 50 per cent.

Progress Made in Shop Delivery

The second class of positive service rendered by the Union Pacific's stores organization is shop delivery. Of the two, shop delivery possesses more nearly the character of pure service since the advantages are most predominantly with the consumer. In brief, shop delivery is the system of delivering the materials and supplies directly to that point in the shop, roundhouse or car repair facilities where they are to be used. In this respect it is one of the most, if not the most, recent innovations in stores practice and a radical departure in the relations between the store and mechanical departments. In effect, it discards the traditional store policy of "come and get it" for the policy of "here it is." Its introduction by stores

The Rear End of the Supply Train, Showing the Cars Regularly Assigned to the Service

organizations, on their own initiative, in view of the additional responsibilities undertaken in so doing, affords one of the best indications of their progressive attitude in furthering the interests of railroads as an entirety.

Shop delivery was introduced on the Union Pacific in a small way three years ago. The important question at that time was the allocation of the cost of the delivery service,—whether it was to be carried by the stores organization or by the mechanical forces. Though the work was delegated to the stores department it has been eximportance, although still in the process of development. tended so that it is now in effect at all shop terminals of The work is carried out under two methods, one the establishment of sub-stores or working stocks in remotely situated places of large consumption in yards where specified stocks are kept and their distribution regulated by the stores department, and second, by operating a system of delivery gangs which make the rounds of designated points throughout the shops and yards at scheduled times, collect the requisitions which are posted there, secure the material from the section stockkeepers in the store, deliver it to the designated points and collect all scrap required in exchange. Under this plan the store is afforded a slightly better control over the stock than might otherwise result, but the principal advantage is in eliminating the necessity or opportunity for machinists and other skilled workmen to leave their work to go after the needed material. In meeting this requisite of efficient stock practice the store department renders a distinct and valued service.

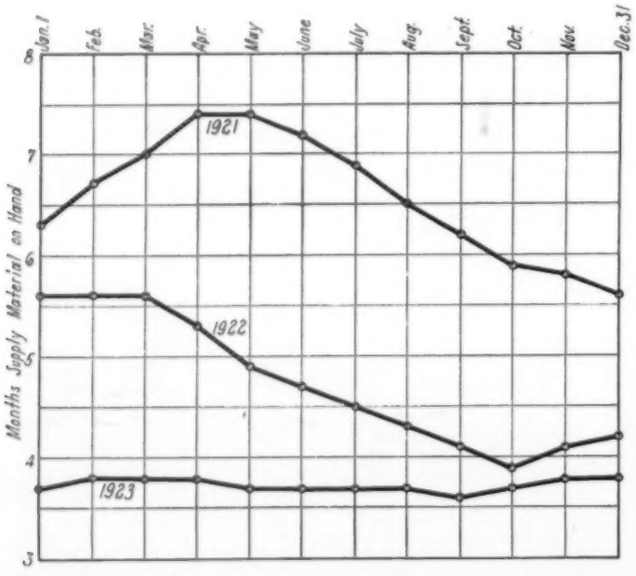


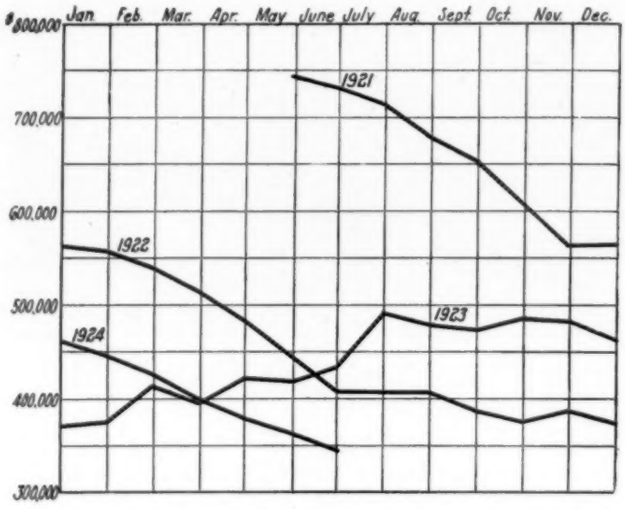
Chart Showing the Progressive Condition of Stock in Terms of the Number of Months Supply on Hand

Reclamation Highly Developed

The Union Pacific system of purchasing and stores is undeniably a system of service as well as supply. But associated with supply and service there is a third function,—salvage. The subject of reclamation receives special attention on the system, being constantly under the supervision of a reclamation inspector whose function is not alone that of devising ways of utilizing scrap to the best advantage under prevailing conditions but also of detecting instances of improper or excessive use of material and other avenues of waste and in bringing about their elimination.

The actual work of reclamation on the Union Pacific is carried out in a variety of ways, depending upon the conditions. At some points the work is performed by the mechanical department on authority of stores department orders, while at other places separate reclamation plants under the immediate supervision of the stores department carry on this work. In no case, however, is material reclaimed until a necessity arises, that is, until orders are made by the stores department for the material. This permits closer supervision and more accurate accounting.

In handling scrap the Union Pacific pursues a method somewhat different from that practiced on most roads.



The Progressive Record of the Value of Boiler Flues in Stock is Typical of the Charts Made of Separate Commodities

The traditional scrap docks at storehouses have been practically abolished. To a large extent the same is true with respect to the local shops, where the scrap, instead of being put in bins as formerly, is now placed in out-of-service cars assigned to this particular service. These cars are placed at convenient points in the shop yards and as the scrap is accumulated it is loaded directly into the cars for shipment to the nearest concentrating point, where the same cars, upon being emptied, are used in transferring wheels on axles and other bulky material back to the originating point. When scrap cars are received at the concentrating point their contents are unloaded directly on the ground by means of locomotive cranes equipped with magnets. The scrap is then sorted into grades and any reclaimable material removed, whereupon the accumulation of scrap is in condition to be loaded and shipped to the market, which is done monthly. These markets are Omaha, Neb., Kansas City, Mo., Denver, Col., Los Angeles, Cal., Salt Lake City, Utah, and the Portland gateway.

Locomotive Cranes Prove Money Makers

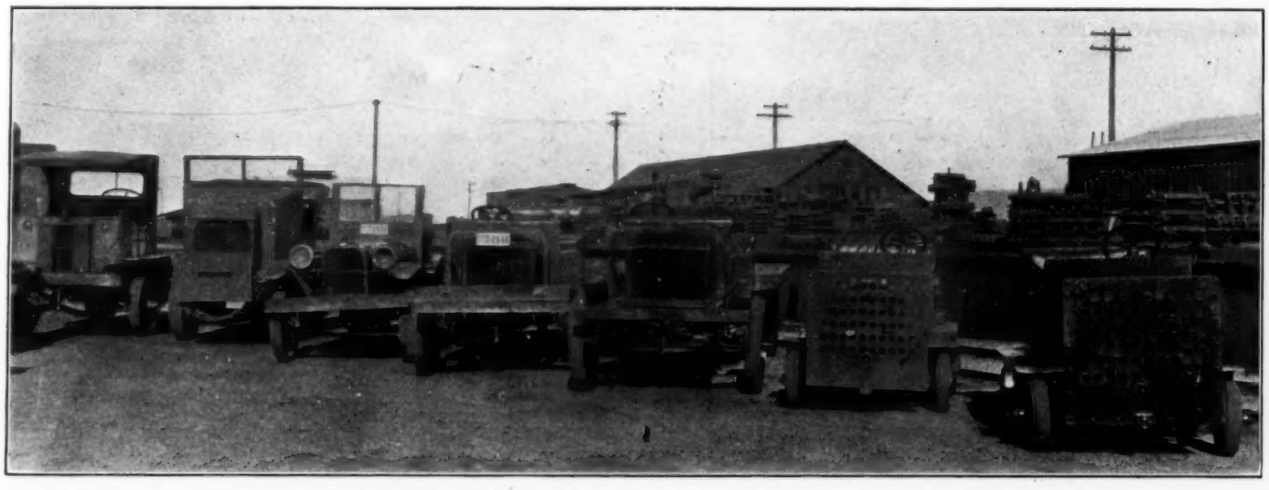
As previously mentioned, the stores buildings have been planned to dispense with elevators and columns, etc.; the unit piling practice adopted to simplify stocktaking; racks designed to eliminate the need of ladders, etc.; scrap cars adopted to dispense with repeated handling of material; unit platforms to eliminate obstructions to traffic, etc. In this respect the organization has displayed a conspicuous zeal for labor saving methods. But it has demonstrated a progressiveness also in the numerous mechanical devices that have been placed in service to supplement the struc-

tural details and stores methods in promoting efficient operation.

A few years ago practically the only aids to manual effort in stores work were the freight house truck, the wheelbarrow, a few timber dollies and a pinch bar. This was equally the condition on the Union Pacific. At present, however, it is impossible to find any storehouse without a more complete equipment of mechanical aids to its work. Distinctive among these aids are the telephone systems in the larger stores under which each section

Stores Delivery Equipment at Omaha

stockkeeper has his individual 'phone with which to communicate with the office or with the shop without delay or additional help. Principal among the power equipment are the locomotive cranes and magnets which have been installed at all points for handling scrap or doing lifting work throughout the yards. The equipment also includes a traveling crane at Pocatello, Idaho; a number of tractors and motor trucks; a collection of rail unloaders; gravity conveyors at all lumber yards for use in loading or unloading cars. In all oil houses may be found manually operated elevating trucks with which to handle barrels and similar bulky materials. This equipment is in addition to adding machines and comptometers, and numerous small tools of special character to simplify the unpacking of boxes and to aid otherwise in handling the stock.



Trucks and Tractors Are Conspicuous Among the Mechanical Aids of the Stores—A Portion of the Equipment at Cheyenne

Charts Show the Way

When the centralization of the purchasing and stores organization was accomplished and attention directed to the business of reducing surplus stock and eradicating waste in the use of material, it was felt that marked success in the work required the full co-operation of the rank-and-file. One line of action open was the usual method of relying upon "campaign literature," that is correspondence with line officers devoted to a general discussion of the problem and progress, supplemented by individual letters based on a special study of local conditions. There was no way of avoiding the necessity of some correspondence. But charts offered a more effective means to this end. Charts were useful, if not indispensable, at headquarters and they were accordingly adopted for use on the line.

At the outset graphical charts were prepared immediately for each unit and for the system as a whole, showing the stocks on hand and the objective it was sought to reach. One chart was prepared, for instance, which showed the trend in the total investment in material over the entire system. On this chart was marked the objective it was desired to reach by June, 1922. This chart was revised each month and sent to all storekeepers and purchasing agents. A second chart was prepared on which were four graphs, one, the progressive record of the total material on hand each month for the system, a second, the record showing the condition of the stores department material each month, a third, the record of all material received each month, and a fourth, the record of all material issued each month. A similar chart was made of the record for each unit, which was furnished all storekeepers in that unit. A separate chart was also pre-

pared for each class of material deserving special attention, typical of which is the illustration showing the progressive record of the value of the boiler flues on hand.

These charts were prepared from the store department accounting documents and were revised from month to month to keep all records up-to-date. Since the aggregate number of copies needed was relatively small the reproduction was accomplished by simply making photostatic prints of the original chart. These charts filled a need not met by stock book records or by correspondence. They not only furnished a convenient record of prior conditions for the use of the general officers in noting general results and detecting irregularities that invited special investigation but also gave the local storekeeper a clear understanding of what the management was endeavoring to do, impressed him forcibly with the progress taking place and indicated his own contribution to the results being obtained. They revealed the exact situation in a way that could not be done completely and expeditiously in any other way. The value of these charts was unmistakable and thenceforth charts became an established institution of the supply department. Their use at present is even more extended than when first adopted.

Weekly Meetings Promote Understanding

The best machinery that man can devise will eventually prove unavailing in accomplishing the purpose of its design if those persons charged with its upkeep lose interest and fail to co-operate. The system under which a stores organization works is no exception to this rule. With a large corps of officers and men, each having their special tasks and interests and more or less remotely situated from each other, a favorable condition exists for misunderstandings between officers within the department and between the department and other departments which operate to retard efficient work and progressive improvement. Correspondence is a poor remedy in such contingencies because it is more or less formal and apt to become too voluminous. The better method is the informal discussion. On the Union Pacific this practice has reached a high stage of development.

In the first place the division storekeeper, who is on the staff of the division superintendent, attends all meetings of the divisional department heads. At these meetings, which are held monthly, the division storekeeper has an opportunity for that exchange of ideas with other departments under conditions where misunderstandings are impossible. Further contact with the problems and viewpoints of the departments are afforded in the shop council (a meeting of all shop foremen), in the safety meetings, fire protection meetings, and loss and damage meetings which are frequent on the Union Pacific and at which the store officers and employees are regular attendants, often participating in the discussions with papers on special subjects. Finally, stores meetings are held weekly which all store employees attend for the general discussion of the local store problems, while all division storekeepers meet twice a year in a general discussion at headquarters. The experience with these meetings renders no less tenable the impression that they are truly that final adjustment in the supply system that underlies its smooth and efficient operation.

An Interior View of the Reclamation Plant at Los Angeles, Calif.

Nickel Plate Hearing

WASHINGTON, D. C.

HEARING on the Nickel Plate unification proposal before Commissioner Meyer of the Interstate Commerce Commission was resumed on May 25, after an adjournment for a week. As at previous sessions a large part of the time was consumed in cross-examination of the witnesses on behalf of the applicants by counsel representing the three groups of dissenting stockholders who insisted on arguing at length with the witnesses, and Commissioner Meyer appeared reluctant to cut short the questioning in spite of repeated protests by W. A. Colston, general counsel of the Nickel Plate.

E. M. Thomas, comptroller of the Chesapeake & Ohio, presented additional statistical evidence, after which H. A. Osgood, vice-president of the Fulton Iron Works, St. Louis, Mo., was recalled for cross-examination regarding a report on the Nickel Plate he had made for the Guaranty Company. W. W. Colpitts, of Coverdale & Colpitts, consulting engineers, and a director of the Pere Marquette, gave a detailed analysis of the income accounts of the roads included in the proposed unification, making the necessary adjustments to represent the current situation for the years 1922, 1923 and 1924, for the purpose of checking the contribution of each company to the proposed system with the proportions of stock of the new company the stockholders of each would receive. He said he had been a member of a committee of directors of the Pere Marquette, which also included E. N. Brown, Thomas F. Woodlock and M. C. Brush, which had con-

ducted negotiations with the Van Sweringens regarding the terms of exchange of stock, and that he had afterward been asked by President Bernet of the Nickel Plate to make the income analysis.

After an examination of the accounts he came to the conclusion that the average of the years 1923 and 1924 represented a present normal net income for the Erie, Nickel Plate and Pere Marquette, while the three-year average seemed more representative for the Chesapeake & Ohio and Hocking Valley. After making the readjustments Mr. Colpitts compared the percentages of contribution of each company to the system, in income available for dividends, on the basis of 1925 interest charges, to the total for the system, with the percentages the stockholders of each would receive in securities of the new Nickel Plate company. This indicated, Mr. Colpitts said, that from the standpoint of income the Chesapeake & Ohio and Hocking Valley stockholders ought to receive better terms for their stock. He pointed out, however, that there were other factors to be considered which were not included in his analysis and that the greatly improved showing of the Chesapeake & Ohio in 1924 was partly temporary, because of the large amount of coal produced by the non-union coal mines in its territory, and partly permanent. Mr. Colpitts also described to some extent the negotiations with the Van Sweringens, showing that they had resulted in the offer of better terms for the Pere Marquette stock than had been originally offered.

C. L. Lingo, traffic manager of the Inland Steel Company, testified that he would like to see the commission approve the application because of the improved service to shippers which should result from the unification. W. J. McGarry, manager of the open-top car section of the Car Service Division of the American Railway Association, was recalled to present testimony as to the other roads to supplement that which he had presented at a previous hearing regarding the improved operating efficiency of the Chesapeake & Ohio during the last two years.

He said that the road had gone from fifty-third place among the roads in 1922 in average mileage per car per day to eighth place in 1924.

Lubricating a Railroad Organization*

The Successful officer or foreman must understand human nature and know how to develop contented workers

By R. E. Woodruff
Superintendent, Erie Railroad, Buffalo, N. Y.

GREAT strides have been made during the past few years in improving the physical condition of the railroads—grades have been reduced, yards enlarged, tracks equipped with automatic signals, locomotives increased in size and efficiency, and cars in capacity. The result has been a reduction in unit operating costs. A ton of coal now produces more ton-miles than ever before. Our organizations are keyed up to maintain this efficiency. We carefully patrol our tracks to remedy defects. Locomotives are inspected as soon as they arrive at engine terminals and the necessary repairs are made. Cars are inspected at each division terminal. Waybills are carefully checked by the accounting department before being filed. Each department of the railroad is interested in increasing its efficiency to the highest possible degree.

In addition to our supervision, supply companies take an interest in the appliances which they have sold to the railroads. Service men investigate the performance of anti-rail creepers, tie plates, motor cars, and other track and signal appliances. Experts show our men how to operate and maintain superheaters, valve gears, automatic firebox doors, feedwater heaters, injectors and similar appliances. Still others show us how to get full efficiency from improved typing, adding and calculating machines. Our service is greatly benefited by this additional supervision and advice.

Again, all material for a railroad is bought by the purchasing agent. Steel, coal and supplies are tested in the laboratory. We know that we are getting our money's worth and that the goods furnished are up to standard.

*An address before the New York Railroad Club, May 15, 1925.

We have all kinds of conventions, and in these meetings and in our railroad clubs discuss technical questions, all leading to higher standards of performance. It must be conceded that these are all worth-while activities; that our American railroads have progressed largely because of the interchange of thoughts and ideas at these meetings.

Along with the development of physical standards, considerable time is devoted to the plan of organization. We read in the technical press about departmental and divisional organizations, about the proper organization of a stores department, or of a signal department, and it must be conceded that a well designed organization is essential to the proper conduct of any railroad.

A railroad organization is a human machine or rather a group of machines. Each machine performs a definite function and they are all needed for proper service. Ordinary machines made of iron and steel are also designed for definite purposes. In time they wear out and gradually lose their capacity for accurate work. To prolong their life, to make them run smoothly and to prevent friction, all bearings and wearing surfaces are babbitted and lubricated. Each type of machine is studied by experts and a proper lubricant is made to fit the need. Nothing is left to guess-work. We know that good maintenance and good lubrication are just as essential as proper design.

Officer Deals in Human Nature

There is also friction in our human machines because men rub one another in their daily work. If these contacts are not properly lubricated, they become heated and the sparks fly. The average officer spends the greater

part of his time handling questions that affect other human beings, encouraging or censuring men, writing letters and co-ordinating activities. The rank-and-file handle cars, locomotives, office appliances, machines and tools. The officer deals in human nature. This requires knowledge not obtained from a study of technical details.

Where does a man ordinarily get his information regarding handling men? From experience. Most officers will state that in their entire service no one ever took the trouble to talk to them about themselves or their methods of handling men. All railroad training and education seem to be along technical lines. Men in all positions, from foremen to vice-presidents, have confirmed this statement. Suppose each machinist or mechanical engineer learned his trade or profession solely from his own experience without any guidance or instruction from others. In his whole life time he could not learn as much as is possible now in a few months under competent instructors. Yet in handling men, we are forced to learn solely by our own "cut and try" methods.

Selection of Men and Materials

Let us consider employment. Thousands of men are hired by the railroads every year. By whom? Trainmasters, yardmasters, agents, chief clerks and foremen. How do we know they use good judgment? True, we have a set of employment rules and a medical examination. But what do we know about a man's mental capacity? We must confess that we know more about the material we buy than we do about the men we hire.

What do industrial plants do? Modern institutions have capable employment managers who pick the right man for the right job and see that a square peg is put in a square hole. In the World War, our army was organized with the aid of mental tests. Yet we pay more attention to the selection of material than we do to hiring human beings.

Let us be frank about it. Most employing officers hire men only when traffic is heavy and more men are badly needed. Almost any man is hired who can pass the doctor's examination. The emergency is usually so great that there is apparently no time to pick good candidates. Men who can go to work at once are given the preference.

It should be remembered too, that employment on a railroad is a more serious question than in the average industry. In private industries, a man is hired for a particular job and no other. If his ability warrants, he may be promoted. On a railroad, through agreement with the brotherhoods and crafts, our men all have seniority rights. The seniority principle is right in theory. It is our fault if it does not work out in practice. We must remember that we are not hiring firemen or brakemen, but prospective engineers and conductors. We should not hire stenographers or junior clerks, but future chief clerks, agents and accountants. It is not enough for an applicant to be qualified for the vacant job; he should not be employed unless he has sufficient mental capacity and personality to measure up to the jobs to which his seniority rights will later entitle him.

Square Pegs in Round Holes

A man is contented only when he likes his work and it is suited to his temperament. Our employing officers frequently overlook this fact and will not employ a man whose previous service record shows that he has been indifferent or careless or who has been discharged from other positions for such reasons. The facts are that a man who has been a failure in clerical positions may still be a desirable candidate for a position as machinist, brakeman or fireman. Experience demonstrates that the average man does not know what work he can best handle, but our employing officers should know as much about men as our storekeepers do of the materials they handle. Yet every division has square pegs trying to fit round holes. Whose fault is this? We can blame our employing officers, yet what have we done to train them?

Again, we know that our engines and valve gears are properly maintained and lubricated, because they are inspected by experts. Defects are remedied before they cause trouble. What do we know of our human machines and how they are lubricated? It is true we have trainmasters, foremen, and supervisors of various kinds. Do we know how they supervise their men? Do they furnish the necessary oil in the right quantities and of the right viscosity to be efficient in each particular case?

Proper lubrication of human machines is more important than for those of the iron and steel variety. If properly cared for, the human machine should not deteriorate but should improve in usefulness and efficiency with each succeeding year.

Supervisors Not Properly Trained

Our agents solicit business and handle complaints. How do we know that they do it in the most efficient manner? We know there is friction. We have grievance committees who tell us of things that need attention. We have "man failures" because of improper instruction. We have accidents because of improper organization. How often do we apply discipline when education would have served better? Is not discipline like locking the door after the horse is stolen? Like cooling a hot box and applying a new brass for want of re-packing to prevent trouble? If our staffs had more forceful personalities, wouldn't our men have cleaner discipline records? Many brainy and otherwise capable officers are sincerely hated by their men because of their lack of tact and human understanding. Is it any wonder that this condition exists when we realize what little time is spent teaching our staff officers the fundamental principles of persuasion, co-operation and the handling of men?

Some may take exception to this and feel that such an education can only be derived by experience, but in reality we are wasting years of valuable time if we depend on our own experience alone.

Officers Fail to Appreciate Situation

Our men do not know how to oil the human machines properly, and worse yet, they are not aware of it. A check of one organization developed that only 14 percent of the officers of all grades had actually read or were reading anything that would help them to improve their knowledge of human relations. Forty per cent read only technical magazines and papers; 46 per cent admitted they read nothing but daily newspapers. Some of these men did not appreciate that they were standing still—each was ambitious for promotion, but was not studying to qualify for advancement. Each was familiar with his own part of the work but apparently was not interested in improving his general education or detailed knowledge of handling men. This was an organization of 163 men and can be taken as an average picture of the situation as it generally exists. Many of these men did not appreciate that there was anything to be gained from reading or studying. Most of them had never heard of the science of character analysis or of psychology. They did not know that there were any books on the question of salesmanship or of securing cooperation. What is true of that organization must be true, to a greater or lesser extent, on all railroads in the country. Is it any

wonder that we have friction and loss of efficiency?

All the troubles on this account do not come to the surface. Each department has its own policies and seeks to make the best showing it can, independent of others. But after all, there is only one purpose of a railroad and that is to render service to the public; unfortunately the heads of each department do not always keep this in mind. Some one must bring them together. He must furnish the oil to lubricate the contacts between the men of different departments and with the public.

The Superintendent As an Oiler

On a division, this is usually the superintendent's job, regardless of the form of organization. He is responsible for the service rendered. The activities of the solicitors, master mechanic, division engineer, freight claim agent, personal injury claim agent, accounting department, stores department and others all affect the operation. He must get results regardless of conditions. He furnishes the babbitt and the oil.

What is this oil and what does it consist of? Each has his own brand, made according to his own formula. One brand is good, another is poor, others vary so in consistency as to be unreliable. One is too thick for use under adverse conditions, another is too thin to carry the load at the required speed. Have we any standards? No! These have all been developed from each man's personal experience.

We treat our freight cars better. We have experts who sell us suitable oil and show our men how to use it to get the best results. Our whole physical plant is inspected and properly oiled by trained men, but our human contacts rub, wear, hiss and blaze. Any two hard surfaces when rubbed together wear unless properly oiled. Even soft materials, such as wood, will cause fire under some circumstances. We have specially prepared lubricants for special purposes. In the mechanical laboratory of a modern oil refinery, the chemists design lubricants to fit specific needs. We need different lubricants for different people, so let us check up the requirements and see if we can write the specifications for the correct lubrication of our human machines.

Lubricants for Human Machines

It must be agreed that the first step, in the elimination of friction, is the proper handling of men. This is a species of persuasion, the art of salesmanship. Railroad men are notoriously poor salesmen. The art of persuasion does not come natural to them. It must be acquired.

Salesmanship in its broadest sense, is the selling of one's point of view—of the ability to get the other man's mind to work in harmony with that of the seller. Each officer is a salesman in its truest sense. He is selling his ideas and thoughts from morning to night, year in and year out.

To be a good salesman, he must know something of psychology—of what motives actuate men and what appeals they will respond to. One of the traditions which has been handed down in railroad circles is that "All men must be treated alike," and this now has a false meaning. This was probably intended to mean, "All men must be treated fairly." But it is unwise to treat all men alike for the reason that no two men are alike and each should be dealt with in accordance with his characteristics. Some officers have good intuition and are able to say the right thing at the right time. Others are unskilled and tactless. The good judges of human nature can be made better and the poor men fair judges, by a study of the science of character analysis.

We all instinctively "size up" men when we meet them and we can tell more about the characteristics of an individual by his appearance than we sometimes are willing to admit. Our everyday language is full of expressions like "high brow," "low brow," "determined jaw," "long face," "fine haired," which have scientifically, correct meanings in character analysis.

Most of our staff officers who directly employ and handle men know nothing of these subjects. They know better than to put passenger locomotives on heavy freight trains and they know more about locomotives, cars and tracks than they do about men. As a result, men are employed in offices who are better fitted for other railroad work and some men in shops and yards who would do better in offices.

What is the solution? Some officers can be interested by loaning them books, more can be interested through the medium of lectures, but neither of these mediums is sufficient. Knowledge is not power unless it is applied. Men must be interested in a subject before they will devote any time to it and must use their information before it is of any benefit.

A Unique Experiment

It must be conceded that imitation and experience are valuable teachers. With this idea in mind, a club of 50 men was recently formed on one division. Membership consists of division staff officers of all departments with some chief clerks, agents and yardmasters. It is organized as a literary club with appropriate officers, including critics. Its objects are the advancement and education of its members. Besides other literary work, a prominent feature of each meeting is education in salesmanship. For example, one member takes the part of a freight solicitor and another the part of a shipper who has the routing of some freight. The solicitor does his best to secure the shipments for his road and the shipper uses various arguments against such routing. At the conclusion of the interview, their performance is criticized by the critics and by members of the club, not only with respect to the language used, but the method of approach, the method of awakening interest and the arguments presented.

Another feature of each meeting is the application of discipline. For example, one member may take the part of a trainmaster, another that of a yard conductor who has damaged a car in switching. The trainmaster conducts an investigation and applies proper correction. In like manner, a track supervisor criticises a section foreman; an agent a careless clerk; an agent placates an irate shipper; a grievance committee waits on a master mechanic and makes certain requests. At the conclusion, they are criticised in detail for their performance.

These are object lessons of a valuable kind. They teach men to talk in public as well as how to approach different questions, how to answer them, how to persuade others to their point of view.

These meetings are held weekly and the percentage of attendance is remarkably good. The club has been in existence only a few months but its influence is already felt. It now has a waiting list of men who are anxious to have a share of its training.

Freight traffic men hear operating questions discussed and learn much about the practical operation of a division. Mechanical men and yardmen see clearly from these discussions what good service means, enabling them better to conduct their work for the good of the entire railroad. This exchange of information and the acquisition of the other's point of view are bringing about a fine result; namely, teamwork, and each member is gaining experience and information which help him improve

his personality. We see our staff men in action. Experience demonstrates that a man who lacks the necessary personality and ability to handle his organization also has trouble in public speaking. We know if he has the right kind of oil and if he talks intelligently in the club, that he is able to conduct his own department properly.

Now what kind of men do these staff officers handle and are they different from other human beings? Railroad men as a whole, are of the active, rough-and-ready, independent, liberty-loving outdoor type. Credit men tell us they are the best credit risks of any class of men. They pay their debts promptly, not because they have more money than others but because they do not wish to be in debt. While they wish to own their own homes, they are not seeking to amass fortunes. They are fond of sports and like to treat their work as an interesting game. Their enthusiasm is unbounded when properly aroused. Competition is keen. Each man feels that he is as good as his neighbor and will put forth his best efforts to prove it. It is not accidental that the strongest labor unions in the country are the railroad brotherhoods. They want their rights and will fight for them. If treated fairly, there is no limit to their enthusiasm, or loyalty to an officer or company which they respect; but these same men change into sullen, dispirited, rebellious plodders if their ardor is dampened or they are unjustly treated.

Contented Workers Pay Big Dividends

Statistics show that a good enthusiastic worker will produce one hundred percent more work than a poor, indifferent, 'jack of all trades." Yet, on a railroad, men are paid uniform wages, regardless of the character of individual work. It is for this reason that good men often let up in their efforts to perform efficiently, because they feel that their good work is not appreciated, since a careless, indifferent employee gets the same pay check.

We are willing to spend considerable money in improvements to effect a 10 to 20 per cent saving. Why then should we not take full advantage of the increase in efficiency that is to be gained by having a contented, interested body of workers? It pays big dividends wherever worked out and it means no increase in capital expenditure. We cannot buy loyalty and enthusiasm with money. They must be paid for in better understanding of one another's problems, in mutual confidence and in cooperation.

Results of this kind cannot be obtained with an inefficient staff. The co-operative attitude must start at the top and permeate the entire organization. If the correct spirit and methods are not instilled into the foremen and staff officers, they do not reach the rank-and-file. It does no good to preach co-operation and the only way to secure it is to give it.

The division officers then, are the important links in the chain. Much depends on the kind of oil they use. Our officers come largely from the ranks. Most of them have not had the advantage of college training. Probably less than 10 per cent are college graduates.

College Men As Officers

Has a college graduate a better grade of oil than the one who has not had such advantages? We are all interested in this question. The facts are that most college graduates who have entered railroad service, took engineering courses, either mechanical, electrical or civil. They studied the strength of materials, mechanics, mathematics and shop practice. Their education was along material lines. They learned little about human nature unless they were of the type who were prominent in college activities and clubs. Then, too, most college men feel their educations were completed at the time of graduation and do not seem to realize they still have much to learn, particularly of human nature and business methods. A man who is a real engineer and who gets his thrills from a blue print or the working out of an intricate problem in mechanics is not adapted by temperament to be a good manager of men. A good engineer is a detail worker. A good executive trains other men to handle the details.

Again, we read of men leaving railroad service and going into commercial lines. The man who is commercially inclined and who is looking merely to financial reward is not likely to succeed as an operating officer and probably is happier in conducting some business.

The real railroad man, whether a member of the rank-and-file or an officer, is so intensely interested in moving traffic, in doing things that seem almost impossible, in meeting new problems as they arise, in living the active life of a railroad man, that he is not greatly interested in engineering details nor in maximum financial rewards. Such men frequently leave railroad service and enter business, but soon drift back into transportation work because in such work they are happiest.

The Successful Supervisor

We need the engineers, the lawyers, the accountants, the chemists and other specialists on our railroads and there are positions for all of them in their respective fields, but in addition to any other training he can acquire, an officer must specialize in human engineering—he handles human beings, not material and tools.

It is not necessary for a man to have a college education to learn the things he should know to become a successful officer. If he has the ambition to advance, he will be interested in learning anything that will help his career and he will study human nature through contact with other men, through reading books, attending lectures or through any other medium that may be open to him. By such means he will acquire the ability to lubricate the machinery of his department.

What then, is this lubricant? It is a carefully prepared mixture of confidence, courtesy, co-operation, fair play and human understanding which cannot be purchased with money nor can it be obtained without paying the price. We must remember that to secure co-operation, we must give co-operation and it is well to set a good example. Railroad men like to play games, especially the old one called "follow the leader."

The head of any organization is the lubricator. He is the hair spring of his machine—the regulator. His job is diversified. His life is never monotonous. The demands on his time and energy vary in accordance with conditions. His reward is commensurate with his activities.

His success is measured not by his own individual work but by the output of the unit under his jurisdiction. A smooth running machine that is both safe and efficient is his goal. Not the least of his reward is the feeling of having developed a good organization; of having a capable understudy ready for each job. In fact, there is no pleasure to compare with the satisfaction of making "green" men into reliable, efficient supervisors, capable of inspiring confidence and enthusiasm, of lubricating their machines with the oil of courtesy and understanding, which, in turn, marks the distinction between an efficient organization and one of average ability.

And last, but not least, is the genuine satisfaction of seeing these men develop and advance, of watching their progress and achievements, knowing that he had at least a part in the development of their managerial ability.

Air Brake Meeting at Los Angeles

Opening session featured by address of W. J. Patterson of the Bureau of Safety

THE thirty-second annual convention of the Air Brake Association was held at the Hotel Alexandria, Los Angeles, Cal., May 26 to 29. The association was welcomed by a representative of the city and on behalf of the railroads by W. K. Etter, general manager of the Atchison, Topeka & Santa Fe Coast Lines. Addresses were also made by President C. M. Kidd, air brake inspector of the Virginian, and W. J. Patterson, assistant director Bureau of Safety, Interstate Commerce Commission. Abstracts of these addresses follow:

President Kidd's Address

The question was raised of the advisability of holding the convention at such a distant western point as Los Angeles, but I believe that our selection of this city is justified by the large attendance. In selecting the city of Los Angeles we followed our practice of taking the convention to the different parts of the country in order to accommodate not only the members of the association, but railroad employees in general.

The character of the Air Brake Association is different from that of any other railroad association. It is purely and wholly an educational institution. The more thoroughly air brake education is disseminated, the better will be the operation of freight and passenger trains and railroad transportation will be correspondingly benefited. Perhaps no separate division of railroad operation carries the same responsibility as the air brake. If one road does not follow recommended practice in the maintenance of triple valves, with standard triple valve test racks, codes of tests, properly adjusted piston travel and properly maintained retaining valves and pipes, and another road does this work, the air brakes will operate a low efficiency. All must work together in harmony and co-ordination. This can be brought about only by proper education and that is what the Air Brake Association is striving for. It should have the moral and practical support of all railways and railway officers.

Undoubtedly the coming year will bring with it important developments in air brake work. Better conditioning of the equipment and the intricacies of automatic train control will call forth the fullest attention and best efforts of air brake men. We must be ready!

W. J. Patterson Addresses the Association

At the annual convention of this association in 1919, I presented a paper which set forth quite fully the requirements of law and orders of the Interstate Commerce Commission with respect to air brakes, as well as policies and practices of the Bureau of Safety in their administration. At that time I requested this association to co-operate with the government in bringing about general improvements in air brake conditions throughout the country. That is being done, yet still better observance of the rules governing maintenance and conditions of air brakes is necessary for the protection of employees and travelers on our railroads. At that time I said, "I am a very strong advocate of air brake tests on trains when arriving at terminals, and I believe that incoming air brake tests, together with prompt repair of air brake defects will result in such great improvement in air brake maintenance conditions as to preclude the necessity for more stringent action on the part of the Bureau of Safety than a reasonable interpretation of existing law and the orders of the commission which are in effect at the present time."

What was true at that time is true now and in view of the increasing train length that I then advocated is even more necessary at the present time. Since the date of that meeting there have been several events of outstanding importance affecting the maintenance and use of power brakes. In February, 1922, the Interstate Commerce Commission began an investigation of power brakes and appliances for operating train brake systems, to determine whether and to what extent power brake equipment in common use was adequate and in accordance with the requirements of safety, what improved devices were available, and what improvements should be made to provide increased safety. The condition of repair of air brake equipment which existed at that time is indicated by results of inspections made by the Bureau of Safety.

In the fiscal year ending June 30, 1922, approximately 1,100,000 cars and locomotives were inspected, on which a total of 55,427 safety appliance defects were found. Approximately half of all these defects, or 27,271, were defective air brakes. In that year inspectors of the Bureau of Safety also tested the brakes on 244 trains upon their arrival at terminals; these trains consisted of 8,898 cars, of which 9 per cent were cut out or had otherwise inoperative air brakes; on 294 cars the brakes were cut out and on 508 cars the brakes were inoperative from other causes. The number of inoperative brakes in service was altogether too large, indicating a lack of proper attention.

In addition to this altogether too large percentage of defective air brake equipment, the necessity for this general investigation by the commission into the use and operation of power brakes was revealed by representations which were made by certain railroads that freight trains could not be controlled with a proper degree of safety on heavy grades by means of power brakes alone, as required by the law. In this investigation, after considerable evidence had been taken and tests conducted, the commission issued a report dated July 18, 1924, and among other things stated that "improvements in the operation of power brakes for both passenger and freight trains are essential and must be effected." They further stated that "throughout this proceeding the necessity for better maintenance of present power brake equipment in order to secure proper operation and safely control trains was repeatedly stressed, and this necessity was recognized by both carriers and employees. It is beyond question of argument that piston travel should be maintained within proper limits, triple valves should be kept properly cleaned, brake pipe and brake cylinder leakage should be kept below certain prescribed amounts, and retaining valves with their pipe connections should be kept in good condition; furthermore, rules should provide and proper tests should be made to insure that trains will not leave terminals with defective, inoperative or cut out brakes on ony cars."

During the commission's hearings it was noted that no

witnesses either for the carriers, the brake manufacturers or the employees testified that power brake systems as a whole were maintained in an efficient or satisfactory operating condition. On the contrary witness after witness testified that improved performance would result from better maintenance and that such better maintenance should be required.

Following the issuance of this report several conferences were held between representatives of the American Railway Association—who by the way were members of this association—and representatives of the Interstate Commerce Commission, which resulted in an agreement to adopt certain recommendations for maintenance as a measure for carrying into effect the requirements of the commission's report. These rules will be put into effect at an early date and I know that the members of this association will do their part to see that they are religiously observed. The result of their operation will be observed by the commission to determine their effectiveness. Should it be found that these rules, or rules issued in this manner, are not effective to secure the required improvement in air brake maintenance and operation it will become necessary to consider other means and adopt other methods to secure such improvement.

Revised Rules Establish Minimum Requirements Only

The revised rules establish minimum requirements to which brakes in service must conform, and set forth tests which will disclose whether or not equipment in service meets the prescribed requirements. Each carrier is, however, left free to determine the detail methods and means which it will employ to place and keep the air brake equipment used on its line in the condition required by the rules. Carriers are expected to issue necessary additional rules and instructions, provided, however, that such additions are not inconsistent with the rules which set forth minimum requirements applicable to all carriers.

Another event of great importance in connection with the maintenance and use of air brakes was a decision of the Supreme Court of the United States, handed down April 28, 1924, which construes the associated car provision of the air brake law.

In the fiscal year, ending June 30, 1923, inspectors of the Bureau of Safety conducted terminal tests of the brakes on a total of 1,602 trains which were made up and ready for departure. These trains consisted of 50,254 cars, and on 7 per cent of these cars the brakes were cut out or inoperative. On 615 cars the brakes were cut out, and on 2,809 cars the brakes were inoperative from other causes. In the following year some improvement was indicated. A total of 1,504 trains consisting of 50,910 cars were tested; 3.3 per cent of these cars had cut out or inoperative brakes, 296 brakes being cut out and 1,408 being inoperative from other causes. It should be borne in mind that these tests were made after the trains had been made up and inspected by railroad company employees and the trains left the points where the inspections were made in the condition indicated.

In the case decided by the Supreme Court, cars with their brakes cut out were intermingled with operative brakes in the train and hauled from a point where repairs could be made. The court held that the failure of the power brake on a car did not take the car out of the power brake class; that the cars involved in this case were associated with other power brake cars, that the act specifically requires all power brake cars so associated shall have their brakes used and operated; and that cars on which the power brakes have been cut out can lawfully be hauled only when placed to the rear of all cars having their power brakes operated by the engineer. For many years the Bureau of Safety has contended that all air brakes on each train should be operative leaving a terminal or other point where repairs could be made. This decision supports that view.

In a meeting of this association, it is entirely unnecessary for me to discuss the question of how to maintain brakes. The records of your previous annual meetings are full of descriptions of such work and suggestions as to what is required to be done. From the standpoint of the Bureau of Safety, in connection with the administration of the law, it is entirely immaterial what detailed methods are employed by the carriers to place and keep air brake equipment in condition to conform to federal requirements. Our only concern is that it shall be done, and that repair facilities are provided and tests are made at sufficiently frequent intervals to insure that the air brakes on all cars in trains are in effective operating condition. The distance between points at which inspection, tests and repairs are to be made must be determined separately for each carrier according to their requirements and character of service. The Bureau of Safety will continue to make air brake tests, on both arriving and departing trains, at suitable points to determine the actual condition of brakes on trains operated on each line of railroad.

In improving air brake service on the American railroads, I want to assure you that you have the hearty cooperation and support of the Interstate Commerce Commission.

Report on Passenger Train Handling

In the main, this report was intended to clarify several points brought out in the report last year. After devoting some attention to the possibilities of graduated release and six different methods of making brake pipe reductions, the effect of pressure on triple valve movements was considered.

The method of handling fast trains in suburban service was outlined in the report as follows:

"Run the train in close to the station. Make the first brake pipe reduction of 7 or 8 lb. before reducing the throttle. Just as soon as the brakes have time to begin to hold, reduce the throttle to drifting requirements.

"Immediately reduce the brake pipe pressure for more holding power (with split reductions) till about 18 to 20 lb. total brake pipe pressure is reduced, and the train is located from 50 to 100 ft. from the final stop, and under control, so that 'graduation off' can be accomplished.

"Now, by two or three 'graduations off,' spot the train at the desired point, with comparatively low cylinder pressure at the finish. Pre-release the last one if appropriate or desirable.

"In 'graduating off' use the brake valve in release of 'running position,' as described for road service in last year's paper. While it has been recommended to use release position for the first graduation off, when the trains range from five to eight cars or over, you will find that other items will be found to influence this, such as

(a) Kind of brake valve in use.
(b) Available release pressure.
(c) Capacity of feed or control valve.
(d) Local conditions on each property, and future experience derived from use, will be the best guide.

"Where the stops are made from lower speeds, and 12 lb. to 15 lb. brake pipe reductions are used, operate closer to the final stop before graduating off. Under such conditions, this will be as short as 25 to 40 ft., using one, or possibly two, graduations off, and one final release.

"By operating in this manner you are requiring the engineer to take no chances. He has some available

service brake to fall back upon. He can correct his judgment both by graduating the brake 'on' in quick successive reductions and 'graduate off.' Try and avoid graduating off too much. In case a reapplication is required, do so carefully, with light reductions."

The report closed with a consideration of the relative advantages of the clasp brake as compared to the single shoe. These advantages were summarized as follows:

(1) Normal cylinder pressure per pound of brake pipe reduction.

(2) Shorter stops in emergency due to reduced brake shoe duty.

(3) Reduced brake shoe wear.

(4) Reduced brake shoe and truck maintenance.

(5) Less brake shoe dragging and reduced train resistances.

(6) Longer trains handled with less loss of time, using the same motive power equipment.

(7) Smoother stops.

(8) Fewer slid flat wheels due to shocks, stuck brakes and the transfer of load from one pair of wheels to another.

(9) Fewer hot journal bearings.

The report on passenger train handling was contributed this year by the Central Air Brake Club through its committee, consisting of James Elder, C. M. & St. P.; W. J. Devine, C. & N. W.; and L. M. Carlson, Westinghouse Air Brake Company.

Low Rate Mileage Books Not Required

I. C. C. Finds Basic Rate of Fare Reasonable for Scrip Coupon Books

WASHINGTON, D. C.

REVERSING its previous decision, which was set aside by the courts as representing an unwarranted interpretation of the act of Congress, the Interstate Commerce Commission, in a report made public on May 27, declined to require the railroads to issue mileage or scrip coupon tickets at reduced rates but found that the basic or standard rate of fare for one-way tickets, 3.6 cents a mile, is and for the future will be a just and reasonable rate for the interchangeable scrip coupon ticket which it directed the carriers to issue to comply with the law. Class I steam railroads subject to the interstate commerce act, excepting switching and terminal companies, are required to issue on and after July 1 for use in interstate commerce, interchangeable scrip coupon tickets in denominations of $15, $30 and $90, to be sold at the standard rate of fare, but inasmuch as these tickets will not differ substantially from those now quite generally in use the commission does not prescribe rules and regulations governing their issue different from those now generally in effect. Those Class I roads now issuing or honoring such tickets are directed to publish, file and post all tariffs containing such rules and regulations and those that are not now doing so are directed to do so, and the proceeding will be held open to afford opportunity to travelers and carriers to apply for changes or modifications in rules and regulations and to afford opportunity to carriers to apply for exemption from the requirements of the order.

In the previous order, effective May 1, 1923, which was enjoined, the commission ordered the sale of coupon books at a reduction of 20 per cent. After a rehearing in the light of the Supreme Court's opinion, that the commission was intended to exercise its independent judgment as to a reasonable rate, it concludes that "sound policy dictates that the basic fare should be the same for all classes of travelers," and that it should require no departure from this rule "unless it can be clearly shown, as it has been shown in connection with certain commutation fares, that we are dealing with a class of passenger business which can be so completely segregated that a rate of fare differing from the basic fare should be applied." If doubt hereafter arises regarding the reasonableness of the 3.6 cents rate, it says, that question will receive consideration in a proper proceeding.

The report is by Commissioner Meyer. Commissioners Campbell and McManamy said they concurred because of the opinion of the Supreme Court. Commissioner Cox dissented on the ground of his opinion that "passenger travel would so increase that the revenues of the carriers would not be reduced by establishing and maintaining an interchangeable scrip coupon ticket in the denomination of $90, to be sold at a reduction of 20 per cent from the face value of the ticket, and that rates resulting from such a reduction would be just and reasonable." Following are some extracts from the majority opinion:

The improvement in the revenues of the carriers since 1920 is stressed in the briefs, and properly so. It does not follow that since this improvement in the revenues leaves a possible margin for concessions in rates, the passenger business, and especially a fractional part of this business, is entitled to be the sole beneficiary of this financial improvement.

One of the contentions advanced by the traveling salesmen was that for a great many years railroads have issued mileage and scrip tickets interchangeable between carriers, which have been sold at substantial reductions below standard one-way fares. The practice of carriers in this regard continued until the director general of railroads abolished it during the period of federal control. When the properties were returned to their owners at the end of federal control the carriers continued the new practice instituted by the director general, which was that of the issuance of interchangeable mileage tickets, sold, however, at the same rate per mile as standard one-way passenger tickets.

The carriers deny that they ever had in use a mileage scrip coupon ticket which was interchangeable in the sense the amendment now under consideration contemplates that such tickets shall be interchangeable. The tickets formerly in use were interchangeable for the most part between the issuing carrier and affiliated carriers or carriers in the same general territory. The interchangeable scrip coupon ticket now in contemplation is one which will be interchangeable between a great many railroads operating in all parts of the country. As stated in our original report, the carriers insist that the milage ticket had its inception in the desire of carriers to prefer large shippers, prior to the time when such preferences were prohibited my law, and that for a long time prior to federal control they had sought an occasion for abolishing the practice of selling such tickets at reduced rates. The carriers deny that it was their belief or that their experience indicated that such tickets stimulated passenger travel.

We think it is obvious that the interchangeable scrip coupon ticket contemplated by the amendment differs from any of the mileage tickets heretofore in use, particularly in respect to its general interchangeability. The record indicates furthermore that the interchangable tickets which were formerly in use were issued voluntarily by carriers prior to the time when regulation of their rates and fares became effective. Our attention has not

been called to any instance where regulating authorities have required carriers to issue and sell such tickets at rates below the standard one-way fares prescribed by such authorities.

Those who contend that carriers should be required to issue interchangeable scrip coupon tickets at reduced rates direct attention to the fact that upon the whole the results of operation of the carriers have been more favorable since 1920 than they were at the time when we authorized an increase in the basic or standard fare from 3 cents to 3.6 cents per mile. They urge that this improvement has in large measure been brought about because of reductions in wages of railway employees. Their estimate of reductions in wages was based upon information furnished to them by the Railroad Labor Board, which is said not to take into consideration changes in wages that have occurred since 1922. The carriers introduced testimony to show that because of readjustments in wages since 1922, the estimates of reductions submitted by the traveling salesmen do not reflect accurately the present situation. It is the view of the traveling salesmen that because wage awards of the Railroad Labor Board were a condition to which we gave weight in determining the increases which we authorized in *Increased Rates, 1920, supra,* now that reductions in the wages have occurred reductions in passenger fares should follow the reductions that have already been made in freight rates.

Our authorization of rate increases in 1920 was granted in order that the carriers might earn revenues sufficient to meet operating expenses, which of course included the wages of employees as increased by awards of the Railroad Labor Board, and that they might in addition as far as possible earn a fair return, at that time fixed at the rate of 6 per cent per annum, upon the value of property carriers were devoting to the public service. The carriers did not earn in 1920, and have not as a whole earned during any year since 1920, the fair return prescribed by us. The traveling salesmen contend that this fact does not preclude us from requiring that interchangeable scrip coupon tickets be sold at rates below the standard one-way fare. We are directed to require the issue of such tickets at just and reasonable rates, and we do not consider that the failure of carriers as a whole to earn a fair return would preclude us from fixing rates for interchangeable scrip coupon tickets at rates lower than the standard one-way fare if we could find that such reduced rates would be just and reasonable.

In this connection carriers direct attention to the fact that the operating ratio for passenger service and for services incidental thereto has been higher during each of the years 1921, 1922, and 1923 than the freight operating ratio, indicating, as they contend, that the passenger traffic is upon the whole less profitable than the freight traffic. The following table shows what these operating ratios were during these years:

	1921	1922	1923
Freight	81.7	78.0	76.7
Passenger and allied services	85.1	83.3	81.3

Again the question is suggested, if passenger fares should be reduced because they are too high in view of the improvement in the financial condition of carriers and the reductions in operating expenses, and particularly the wages of employees, should not these reductions be made in passenger fares as a whole rather than in fares for any particular class of passenger traffic?

At the further hearing the traveling salesmen did not insist upon the contention they had made at the earlier hearings to the effect that the sale of an interchangeable scrip coupon ticket at a reduced rate might be likened to the practice of carriers in establishing commodity rates for transportation of carload quantities.

The evidence does not establish that any commercial practice closely resembles the issue and sale of a scrip coupon ticket at a reduced rate. Such a sale has been referred to as in effect an exchange of money for a cheaper money to be used in the purchases of railroad transportation. The wholesale purchase of a large quantity of merchandise is usually coupled with a definite agreement as to the time and method of delivery, as well as the quantity purchased. On the other hand, the holder of a scrip coupon ticket may use any amount of it at any time he may desire during a year from the date of purchase, and may call upon any carrier required to honor the ticket for delivery of the particular transportation service which the holder of the ticket may require of that carrier. The commercial wholesale transaction is between a single seller and a single purchaser. The sale of the scrip coupon ticket is in the first instance a transaction between one who purchases and one carrier which sells the ticket, but the delivery of the transportation service involves many transactions between the holder of the ticket and all other carriers which will be obliged to look to the carrier who sold the ticket for a redemption of the coupons which they collect.

It has been pointed out that the reduced rates for large consumption that are accorded by public utilities apply to the local service for which the demand and quantity of consumption can be forecast with reasonable accuracy and certainty, with the result that the operation of the plant can be arranged in advance to take care of the calls for service.

It is obvious that there are many circumstances in wholesale commercial transactions and in the granting of reduced rates for public-utility services which differ widely from the circumstances surrounding the sale and use of scrip coupon tickets.

A large element of guesswork and speculation is inherent in the very nature of the particular problem with which we are called upon to deal. There are so many factors of uncertainty relating to the volume of the passenger traffic, varying proportions of the classes of traffic which make up the total, changing conditions under which that traffic is conducted, the multitude of conditions which affect operating expenses and other similar uncertain factors, that a categorical answer or a definite finding is impossible. If all the factors which influence a given traffic situation are known and the effect of each of the factors has been measured, and its influence in the past determined, and if, further, these factors are known not to change but probably to remain the same in the future, it is relatively easy to determine the future effect of contemporary action. However, in rate, traffic, and operating matters this is rarely if ever the case. Not only do the factors themselves change, but their relationship to one another changes, with the result that future effects and probable outcomes are necessarily in this sense guesses and speculations. The most that anyone can do is to express a guess or a speculation, informed, restricted, and regulated by the facts of record. All general reductions and increases in passenger fares are so intimately connected with other matters than the fares themselves that a categorical answer to the question of probable effect of changes in rates affecting one class of travel can only be surmised with many reservations, while statistical proof is practically impossible. While there is a limited amount of information in the record relating to the supposed effect on the volume of the passenger traffic of changes in rates, there is not sufficient to enable one to base conclusions thereon with any degree of confidence. It is probably correct to assume that the paucity of definite information in the record along these lines is due to the inherent difficulty of securing such information. How is it possible ever to determine what proportion of a given number of passengers travel within a stated period of time, because there has been a change in the level of the passenger fare? Many people travel when they must whether the fare happens to be high or low. Others travel at certain seasons of the year without much or any reference to the exact amount of fare which they must pay. Still others travel because an attractively low fare is published to a place that for some reason they would like to go to. Obviously the amount of the railroad fare in itself affects different people differently. To some travelers the railroad fare represents nearly the whole of their expenditure for a trip. To others it represents only a small percentage of their total expenditures for the trip. It is apparent that other things being equal a change in the level of the fares affects these two classes of travelers very differently. In a study of the movement of freight it is possible to secure information, if necessary, regarding a large number of individual commodities and thus make an intelligent survey of the probable effect of a change in the freight rate. Because of the many uncertainties surrounding the passenger business and the practical impossibility of giving mathematical expressions to motives, purposes, impulses, and conditions which affect the movement of people, a corresponding study in the field of passenger travel is beyond the power of practical achievement. As a matter of common sense it looks reasonable to suppose that the sale of an interchangeable mileage or scrip book at a reduced fare would increase the number of salesmen who travel. The number of other people who would avail themselves of such a book is much more uncertain and the probable effect on the total passenger movement and the revenues to the carriers are still more uncertain. Uncertainties are cumulative.

As was clearly established in the present record, the carriers have issued and are issuing a variety of tickets at reduced rates. This is a matter that properly rests within the discretion of the respective managements. We should not be called upon to become the general managers of the railroads in this respect. It should be left with the managements themselves to decide whether or not the interests of the carriers and the public which they serve can be promoted by the issue of interchangeable mileage or scrip tickets at reduced rates or by the issue of other forms of reduced rate tickets. Our duty should be performed when we have established a reasonable basic fare and when we have determined that other classes of fares are free from unjust discrimination and undue prejudice or preference. There is nothing in this record to establish that the failure of the carriers to issue interchangeable mileage books at reduced rates has resulted in violation of sections 2 or 3. The carriers individually and collectively are free to experiment with reduced-rate mileage or scrip tickets. Nothing said herein should be construed to the effect that we object to experimentation on the part of the carriers individually or collectively with interchangeable or mileage scrip tickets.

Fuel Convention Has Big Attendance

Presence of many operating and mechanical officers shows growing appreciation of importance of fuel economy

THE opening session of the seventeenth annual meeting of the International Railway Fuel Association, which was held at the Hotel Sherman, Chicago, May 26 to 29 inclusive, was characterized by an unusually large attendance in which many operating and mechanical officers and supervisors were included, as well as the officers of the fuel departments, traveling engineers and a number of delegations of enginemen and firemen, whose duties bring them directly in contact with the consumption of fuel on the locomotive.

For the first time the program this year has been grouped so that matters primarily of interest to the operating officer were discussed on the second day while those subjects of primary interest to the mechanical department were grouped together on the third day.

L. F. Loree, president, Delaware & Hudson, delivered the principal address at the opening session and his address was followed by that of the president, P. E. Bast, fuel engineer, Delaware & Hudson. Abstracts of these addresses and a number of other important papers appearing during the earlier sessions of the convention are given below. These include the following subjects: How Can Management Effect Fuel Economy? by A. R. Ayers, assistant general manager, New York, Chicago & St. Louis; and How Can Fuel Purchases Effect Economy? by H. C. Pearce, director of purchases and stores of the Chesapeake & Ohio.

A discussion of the Relation of Signals to Fuel Saving, by B. J. Schwendt, superintendent of signals, New York Central, will be found elsewhere in this issue.

A Look Into the Future

By L. F. Loree
President, Delaware & Hudson

As a lad I read a story of James Watt seated at the fireplace, watching the boiling pot, noting the lid lifted by the expanding steam, and later working out upon this hint his great invention—the steam engine.

The story was, of course, without foundation, and is typical of much purely imaginative matter that is dished up to us. Sometimes I have thought that to no inconsiderable degree the inertia and closed mind of the public is due to the mass of misinformation that is gathered in youth, and the ill result goes even farther, since there is truth in the warning of the Greek philosopher "that we should not lie to the children, if for no other reason than that when they grow up they will not believe even the truth that we tell them."

I suggest we may set aside from this discussion the "Aeolipiles" of Hero of Alexandria, 250 years before Christ, and the toys and experimental contrivances using steam that emerged from time to time until about two centuries ago.

The First Pumping Engine

Then, in 1712, Thomas Newcomen, an ironmonger or iron merchant of Dartmouth, England, "fixed the first engine that ever raised any quantity of water, at Wolverhampton." There is still in existence an engraving of it. Looking at this drawing one cannot but be surprised at the maturity to which the engine had been brought and the wonderful achievement that it really was.

And yet this engine was not a steam engine driven by the expansive force of the vapor of water, but rather an atmospheric engine, the condensation of steam being used to create a vacuum, and the weight of the atmospheric column contributing the driving force that depressed the piston and generated the motion converted by suitable mechanism into work.

The engine actuated a lifting pump, a walking-beam communicating the pull of the piston to the pump-rods, the weight of the pump-rods in turn bringing back the piston to the top of the cylinder. The engine was able to work entirely of itself, making 12 strokes to the minute and raising 10 gallons per stroke from a depth of 150 ft., the pumps being in two lifts of 75 ft. each. The boilers were made of copper; the cylinders, of brass, were about 2 ft. in diameter and 6 ft. stroke. The steam used had a pressure but little above the atmosphere, while the effective atmospheric pressure, having allowed for the several frictions, was perhaps 6 lb. per sq. in.

Henry Beighton, the most distinguished civil engineer of his time, worked out tables of dimensions for work under different conditions, and by 1725 the diameter of the cylinder had grown to 40 in., the strokes had increased to 20 or 25 per minute, and water was being raised from a depth of 300 ft.

John Smeaton, a celebrated civil engineer, turned his attention, about 1765, to the atmospheric engine, and having collected data from some 100 engines, and conducted a series of experiments, set out rules for the best proportion of the parts. The effect of Smeaton's efforts, which were largely reflected in a decreased fuel consumption, is seen in comparing the results he obtained raising 9,450,000 lb. of water one foot high by a consumption of one bushel—84 lb.—of coal, as against the average of the 100 engines he examined, which gave a performance of 5,590,000 lb.

The great sphere of the enigne lay in the coal fields, where a supply of fuel was easily and cheaply obtained. With the remission of the excise duty on coal used for pumping engines, its field was extended to the tin mines of Cornwall. It was a labor-saving device of the first importance. Of one it was said, "previous to the erection of this engine, 50 horses and 20 men, working night and day, had been required to raise the water from the mine, whereas the engine, with a single attendant, in 48 hours working, cleared the colliery of water for a whole week." The introduction of the atmospheric engine did no less than to create a new era in the mining and commercial interests of Great Britain.

Where James Watt Comes In

In 1757 James Watt was in the service of the University of Glasgow, Scotland, living and having a shop within the college walls under the title of "Mathematical Instru-

ment Maker to the University." Here he enjoyed intercourse with professors and students interested in his branch of activities, and here he carried on many experiments with the force of steam.

The University owned a small model of Newcomen's engine, and in the winter of 1763-4 it was given to Watt to be repaired. Watt was surprised and interested by the great amount of steam consumed by the little engine, and set about seriously to investigate the matter. He found that the engine at each stroke consumed several times as much steam as would fill the cylinder, and that the large amount lost was because of its condensation against the cold sides of the cylinder.

Early in 1765 the idea occurred to him that the steam, instead of being condensed in the cylinder, might be drawn off into a separate vessel and there condensed. By this means the cylinder might be kept as hot as desired, the condenser as cold as necessary, no steam be wasted and a perfect vacuum obtained. At the time he secured his patent, on January 5, 1769, for "a new method of lessening the consumption of steam and fuel in fire engines," he estimated the saving of steam at one-half. When Watt and Boulton, of Soho, near Birmingham, England, put their engine on the market, in 1776, its superiority over Newcomen's in power and economy of fuel was soon demonstrated and the success of the invention assured.

Watt's Purpose was Fuel Economy

The extent to which Boulton and Watt were dominated by the idea of fuel economy is clearly indicated in the terms they adopted in marketing their engine. They stipulated to receive the value of one-third of the fuel saved by each engine when compared with a common one (not with Smeaton's improved engine) burning the same kind of coal, to be paid annually or half-yearly, with an option of redemption at ten years' purchase. In Cornwall a committee canvassing the situation found that the average duty of the Newcomen engine was 7,037,800 lb. raised one foot high by the consumption of a bushel—84 lb.—of coal. Boulton and Watt's low-pressure engines performed an average duty of about 18,000,000 lb. In 1798, one at the Herland mine performed 27,000,000 lb., and Watt, visiting the mine on purpose to examine it, pronounced it perfect.

The first engines built by Boulton and Watt were atmospheric engines, the open-topped cylinders being surrounded by a steam case, but further economy was found by covering the top of the cylinder and admitting the steam above the piston.

On March 12, 1782, Watt patented his double-acting steam engine, using the expansive force of steam below as well as above the piston, and at once solved the difficulty of applying it successfully to produce a continuous rotative motion. This was the crowning improvement. Confined heretofore almost exclusively to raising water, it now entered upon a career of world-wide utility.

Little new has been introduced in the mechanism of the engine; in its main features it is today very much as Watt made it. Watt had mastered the difficulties in the way of employing steam at high pressure; he knew that the steam could be discharged into the open air instead of into a condenser chamber; he was alive to the availability of the expansive force of steam; but he was afraid of the danger attending its use. The materials at his disposal did not command his confidence, nor was there sufficient skill on the part of the engineman. To the last Watt employed steam of a pressure similar to that used in the Newcomen engines, that is, not more than one or two pounds above the pressure of the atmosphere.

The commercial success of Watt's invention, designed, as we have seen, to produce an economy in fuel consumption, had been very great; but here the wealth and influence, the energy and tact of Boulton, were invaluable complements to his inventive genius.

A Prediction of Thirty Years Ago

Looking to the future, we have to form some conception as to how the coming motive power shall be designed and equipped. There is nothing at the present time that seems promising in electric, Diesel, turbine and various non-reciprocating steam engines. We must continue to fix our attention upon the reciprocating steam-engine locomotive. Here we may discern a number of factors which may be utilized to improve its service and reduce its expense of operation.

In March, 1895, Matthias N. Forney, the author of "The Catechism of the Locomotive," writing as Editor in the American Railroad Journal and Engineering Magazine, said:

> Let it be assumed that the fuel consumption on a road is represented by $1,000,000; if 14 per cent was saved by simply testing it and learning which was the best quality to buy, the $1,000,000 would be reduced to $860,000. If, now, we save 10 per cent by an improved valve gear, the million is reduced to $774,000. If feed water heaters should save 14 per cent, then the cost of fuel would be lowered to $665,640; and if superheated steam should fulfill its promise of 30 per cent saving, the fuel account would be brought down to $532,512.

I have thought it might interest you if, for a moment, we try to forecast the future from this angle of inspection.

In 1915 the typical large freight locomotive of The Delaware & Hudson was its Class E-5 of the consolidation type, using saturated steam, slide valves and single expansion cylinders, carrying 210 lb. boiler pressure, weighing 227,200 lb. on driving wheels, and rated at 50,600 lb. tractive force. In moving 1,000 actual gross ton-miles, including its own weight, on a 0.5 per cent grade, at average freight train speeds, this locomotive consumed 160 lb. of coal. The first marked improvement was the application of superheaters and the substitution of piston valves for the slide valves, increasing the weight of the engine on the driving wheels to 231,700 lb., and the tractive force to 55,100 lb., and reducing the fuel consumption under like operating conditions to 130 lb. of coal, or by about 19 per cent.

What the "Horatio Allen" Has Done

Last year we developed a type of consolidation locomotive, changing the E-5 class as little as was necessary, which we named the "Horatio Allen," after the engineer who ran the first locomotive in this country. This locomotive carries 350 lb. boiler pressure, weighs 298,500 lb. on the driving wheels and has developed 75,000 lb. drawbar pull, as measured by the dynamometer. The "Horatio Allen" uses a moderate degree of superheated steam admitted to and exhausted from the multiple expansion cylinders through large valve and port openings. It has a water tube type of firebox with extraordinarily large evaporation surface and a fire brick baffle wall extending the full width and length of the firebox which insures full utilization of the hand fired coal, with long flame travel, securing maximum radiant heat effect and minimum cinder and stack losses. With this engine 1,000 actual gross tons are moved under like operating conditions with 55 lb. coal consumption.

It is probable that within the year a satisfactory feed water heater will be on the market and that the equipment for burning coal pulverized to about the fineness of talcum powder will be brought into practical use.

Possibilities of the Next Ten Years

Looking over this score of years from 1915 to 1935, and following Mr. Forney's example, the following

changes may be anticipated during the next ten years:

TYPICAL STEAM LOCOMOTIVE COAL CONSUMPTION PER 1,000 ACTUAL FREIGHT TRAIN GROSS TON-MILES ON EQUIVALENT TO A 0.5 PER CENT GRADE.

Year 1915		160 lb.
Reduction in total fuel consumption by means of—		
1. Superheating	to	130 lb.
2. Fire brick baffle wall	to	124 lb.
3. Feed water heating	to	113 lb.
4. 350 lb. boiler pressure	to	96 lb.
5. Improved boiler design, circulation and evaporation	to	84 lb.
6. Multiple expansion cylinders	to	70 lb.
7. Improved steam distribution and reduced cylinder back pressure	to	60 lb.
8. Burning powdered coal in suspension	to	44 lb.
9. Reheating of high pressure exhaust steam in multiple expansion	to	42 lb.
10. Miscellaneous items, such as increased train loading through the use of an auxiliary locomotive, utilizing the dead weight of the tender for tractive purposes, greater sustained boiler horsepower capacity, substitution of poppet valves for piston or slide valves, and higher superheat on account of the use of powdered coal, may bring the final figure down to about		38 lb.

This is somewhat less than one-quarter of the 1915 locomotive fuel consumption. The effect of this would be to reduce the 90,000,000 tons of fuel now used in freight train service to about 27,000,000 tons, effecting a total economy of something like $200,000,000 per annum.

I have had these figures carefully checked with available cost and performance sheets of various railroads, with dynamometer-car road and other tests made by various steam roads, and with laboratory tests made at Purdue University, University of Illinois, and the Pennsylvania, at Altoona, Pa. Discussing them with my own people, they do not seem to me extravagant. There are, of course, debits to be set off, the cost of these appliances and their upkeep, determinable only by experience. But the possible savings are large, and that they will not be confined to those I have listed, no one can doubt.

The joy of our occupation is not alone in the service we render but in the knowledge that the industry is alive and vigorous, expanding and improving, exacting from us our utmost effort, inviting every exertion from the dullest of routine duties to the liveliest flights of the imagination.

Let us enjoy to the full the opportunities it offers, meet adequately its drafts upon us and demand for it the respect it merits from those it serves.

How Can the Management Effect Fuel Economy?

By A. R. Ayers
Assistant General Manager, New York, Chicago & St. Louis

There are a great many things that a general manager can do to affect fuel economy. First, and foremost, is to take an active personal interest in the subject. If the general manager himself will place fuel economy in the front rank of important subjects and keep it there, he will be certain of maintaining the interest of the officers and men under him, and without this interest and co-operation there can be no such thing as fuel economy.

Fuel economy is so closely involved in the general operating efficiency of the railroad, and the interests of the different operating departments are so closely interlocked, that the chief operating officer may help very much by setting up, with the assistance of the various departments, a definite plan for the development and improvement of the railroad, in order that the actions and recommendations of the different departments looking toward better fuel performance may fit together.

This plan should take into consideration, for example, what improvements should be applied to existing locomotives, what types of new locomotives should be purchased in the future, what effect will this have upon the loading and speed, and number of trains, and what additional investment, if any, will have to be made in tracks, bridges, and shop and terminal facilities. If the departmental and division officers are familiar with this policy, they can all work together to get the maximum net saving for every dollar spent.

Even though it is the duty of the chief operating officer to formulate such a policy, I still feel that it is a mark of strength and ability on the part of departmental officers to originate recommendations for improving fuel performance without waiting for suggestions to come from higher up, such recommendations to fit in with the general policy and to be supported by figures to show that they will more than pay their way.

It is not always easy to get the figures to tell the complete story, because usually more than one department is involved. General managers may well make this a frequent subject for discussion at staff meetings and with individual officers, and develop the best methods for the use of division and general officers for figuring costs and savings, taking into consideration such things as initial cost, maintenance, fuel saving and other operating savings.

Most elements of fuel economy produce equally great, and even greater, savings in transportation costs other than fuel and a full realization of the total saving available would some times obtain the necessary authority for expenditures, when the fuel saving alone would not be sufficient. It is the duty of the general manager to know that these things are fully and correctly analyzed.

Most of the things that a general manager can do to affect fuel economy, except giving his own personal interest, involve the expenditure of more or less money, and I would like to call your particular attention to the importance of studying these things carefully, because I believe that railroad managements, as a rule, are willing to authorize expenditure to produce fuel economy when they are reasonably sure that net savings will result.

A Good Grade of Fuel as a Basis for Economy

Furnishing a proper grade of fuel is one of the most important ways in which management may affect fuel economy. Neither the mechanical nor transportation department usually has control of the fuel supply and there is no doubt that the character of fuel furnished is a governing factor of train and engine operation, and often affects operating costs very materially in other ways besides the direct fuel cost. The best possible fuel which the conditions of the railroad will permit should be furnished. The fuel may not always be the same for the entire railroad, but it should always be a uniform grade for a particular engine district, which will permit the motive power department to design or draft all the engines in the district to suit the one kind of fuel and in this way get the best results possible.

One reason that fuel performance is such a good measuring stick for operating efficiency is because the figures may be obtained quickly. The New York Chicago & St. Louis has a statement sent out four times each month to all transportation and mechanical department officers, including road foremen, trainmasters, dispatchers, etc., showing the gross ton miles handled in freight service, the tons of coal consumed, the pounds of coal per 1,000 gross ton miles and similar information for switching

service. These figures are available about ten days after the close of the pereiod which they cover, which is much sooner than ordinary operating statistics can be obtained. These reports pass through the hands of the vice-president and general manager personally, and his frequent comments are evidence of the importance which he attaches to them.

On the railroad in question the fuel consumption for the year 1917 averaged 207.8 lb. per 1,000 gross ton miles; for the year 1924 it averaged 124.2 lb. and for the first four months of 1925, 123.8 lb. This represents a saving of $1,180,000 in the fuel cost for 1924 compared with what the cost would have been at the 1917 rate of consumption and at the same time, in spite of greatly increased costs of labor and material compared with 1917, the operating ratio for 1924 was more than 3 per cent below 1917.

How the Results Were Accomplished

In addition to the usual items of betterments to existing locomotives, improved types of new locomotives, additional track facilities, better fuel, etc., with which you are all familiar, you may be interested to know some of the things that the management of this road authorized to help improve the fuel performance.

As we had no dynamometer car, one of the first steps, after assigning a competent officer to devote his entire time to the question of fuel performance, was to assign him a steel underframed caboose to be hauled immediately behind the engine in order to follow up the performance of engines and trains. Two traveling firemen were assigned to each division, where there had been none before, and as the possibilities of the situation developed each of these divisions was assigned a caboose with speed recorder for the use of road foremen, traveling firemen, trainmasters and others.

The first caboose has been replaced with a fully equipped dynamometer car, but the other four cabooses are still in regular service and it is regular practice to run test trains for the benefit of the transportation department or the mechanical department, or both together, to develop information as to tonnage, speed, fuel performance, condition of engines, etc.

Diagrams are available showing the drawbar pull of engines at different speeds, and the dynamometer car is used for the purpose of getting accurate measurements of engine performance and to know what an engine is doing and what it ought to do without any element of guesswork. I believe the enginemen appreciate this last feature, because it insures that they will not be unjustly criticised, and at the same time they know they will get credit for good performance. Enginemen and trainmen are invited to ride the test cabooses and the dynamometer car, in which the records are kept of the best runs from the standpoint of tonnage, speed and minimum amount of fuel consumed. The natural desire to be enrolled among the best, on the part of each man who sees these figures, has a great deal to do with the steady improvement in performance.

Dynamometer Car Locates Defects and Determines Cost of Delays

On test trains where the engine is operated most of the time at or above its theoretical drawbar pull, it is remarkable what can be developed as to the ability of an engine to handle heavy tonnage at high speed when in good condition and equipped with modern fuel saving devices and other mechanical improvements. The dynamometer car has shown us that slight defects in valve gear, packing, front end appliances, and in fact the general mechanical condition of the engine, have much greater effect on the hauling capacity of the locomotive than might commonly be supposed. In one case the trouble was found to be a restricted throttle opening; this engine had a good reputation but would not develop anything like its proper drawbar pull until the trouble was located and adjusted.

The fact is that modern locomotives develop so much power that their performance should be measured rather than estimated. One of the ways in which railroad management may affect fuel economy is to recognize this fact and try to work out some plan whereby their engines will be maintained in condition to do their best and at the same time to measure the performance on the road in order to know that they are getting a good return on their investment and their maintenance cost.

The dynamometer car and the test cabooses have demonstrated that cutting down the tonnage of trains to overcome delays is a very costly proposition. By running test trains in which delays were practically eliminated by special arrangements, it was possible to determine with considerable certainty the increased tonnage that could be handled and still make the necessary time if the delays could be eliminated or reduced, and information thus obtained is a very direct measure of the amount of capital expenditure that can be justified to overcome or reduce the delays. These same test runs with coal accurately weighed developed the point at which increased loading of the engine produced the minimum consumption of coal per 1,000 gross ton miles, and beyond which the unit consumption of coal started to increase.

It was found that increasing the tonnage up to the reasonable capacity of the engine in good condition, and making frequent test runs, accomplished a number of purposes:

1—It immediately decreased the number of trains.

2—This in turn reduced delays on account of stops and meeting points (the road in question being largely single track) and this permitted further increases in tonnage.

3—It reduced the number of engines required to handle the business and in this way materially reduced terminal handling costs and congestion.

4—It brought out the great effect that quality of fuel has upon the ability of an engine to handle tonnage and make time, also in the elimination of delays on the road on account of cleaning fires, dumping ash pans, flues stopped up, etc.

5—The reduction in fuel cost per 1,000 gross ton miles was very marked; part of this, however, being due to better and more uniform grades of fuel furnished.

Engine Maintenance and Fuel Supply Important

I doubt if it is always realized how much the mechanical department can benefit by keeping down the number of engines handled. This can only be accomplished to a maximum degree by maintaining the engines in the best condition to develop their maximum capacity and then to see that this capacity is fully utilized. The general manager can play a most important part in helping the transportation and mechanical departments to work together to accomplish this result.

Frequent tests of fuel are made during the year to make sure that proper grade is maintained, and coal from a new source of supply is not accepted in any considerable quantity unless it has proved satisfactory in service tests in addition to a satisfactory analysis. When several different coals are to be tested at one time the tests are made with one locomotive on one division, in order to keep conditions the same as far as possible so that the only variable will be the coal itself.

Delays to trains chargeable to defective cars, lack of proper inspection, lack of sufficient trackage and defective track all affect fuel consumption; in fact inadequate operating facilities may all be capitalized in the same way, to develop an answer to the question, "Can a remedy be provided which will more than repay its cost?" Fuel

performance is one of the best measuring sticks of operating performance. It is easy to get and to keep the interest of officers and men in fuel performance, train loading, speed of movement, maintenance, etc., if they are made to feel that their performance is being properly measured, that they will be given the proper facilities for supervising and measuring their own performance and that they will accordingly be given the proper credit for the results obtained.

In attempting to handle this subject it has been almost impossible to keep strictly to the subject of fuel economy for the reason that, as you well know, devices, or methods of operation, or facilities which would save fuel are frequently utilized in other ways; sometimes to increase capacity, sometimes to reduce labor costs and sometimes to keep down fixed charges, but it is the ability to get more work out of a pound of coal that is primarily responsible for the saving.

President Bast's Address

In reviewing the activities of this association since its inception 17 years ago, its work has been mainly of an educational character, endeavoring to present the fuel problem through its various angles to the personnel of all departments on the railroads, with a view of having them realize their responsibility in the purchase, inspection, weighing, distribution, handling, use and accounting of fuel, all of which in the end result in the greatest possible reduction in fuel costs.

We all realize the magnitude and importance of the fuel problem; it is creative work and requires initiative, ability in engineering, organization and management persistently applied. However, it is gratifying to observe that since the question of fuel conservation has been aggressively taken up by the railroads and by this and other associations, consistent progress has been made in the reduction of the amount of fuel used per unit of work in the various classes of service. In this respect we can feel justly proud of the results obtained, which reflect the excellent work on the part of management, mechanical, transportation and other departments, and all employees and others, who have contributed their share to the economical utilization of fuel. We should not lose sight of the fact that fuel conservation is an economic necessity and has far reaching direct value, not only to the railroads but to the country in general.

In this room one year ago R. H. Aishton, president of the American Railway Association, in addressing our association emphasized the importance of the saving of one pound of coal per unit of work in the combined classes of service and made us realize as never before the splendid economies that would acrue to the railroads through such saving. His address gave us a new and fuller sense of our responsibilities toward the railroads and those they serve. Our association at that time, through its officers, pledged itself to effect this saving during the ensuing year. A poster featuring this pound of coal was distributed by this association over the various railroads. The response was far beyond our expectation.

I estimate that 77 per cent of the fuel used is in freight and passenger service. Applying the known ratio of saving in these services to switch and miscellaneous service the total savings in all classes of service from efficiency alone during 1924 compared with 1923 was 10,647,000 tons, or a money value based on the average cost of fuel per ton during 1924 of $32,250,000. These splendid savings are based on increased efficiency and only tell part of the story, since the major savings of the railway fuel bill were accomplished through reduction in price. For instance, in 1924 the railroads saved a total of over $93,000,000, of which 65 per cent was due to price. During the first two months of 1925 compared with the first two months of 1924 the railroads are showing a further saving in about the same ratio. Unless the economic conditions of the bituminous coal industry improve, I am concerned whether or not the railways of the United States will be able to maintain the splendid savings in fuel cost which they have enjoyed during the past two years.

While we have contributed a share in the economical and efficient use of fuel, much remains to be done. Many promising opportunities await the activities of our association by advancement of information on the fuel problem, such as through the medium of illustrated bulletins, the distribution of fuel performance statistics of the various railroads, the establishment of an economical figure in fuel consumption in the various classes of service, all of which would have a stimulating effect in creating an interest that is so vital in further solving a problem of such importance as that of railway fuel.

We are living in an age of progress and advancement. It is my hope that our association will continue to advance and prosper and that in the near future conditions will permit the working out of a plan for the endowing of a scholarship annually for the benefit of worthy young men to pursue courses in engineering and combustion.

How Can Fuel Purchases Effect Fuel Economy?

By H. C. Pearce
Director of Purchases and Stores, Chesapeake & Ohio

In 1923 the total cost of transportation was $4,895,166,819. The total purchases were $1,738,703,000. The total coal purchases were 159,918,000 tons. The cost of coal was $537,202,000. The cost of coal represents 31 per cent of the total purchases, and 10 per cent of the total cost of transportation.

These figures do not include fuel oil used for locomotive fuel. Taking this into consideration, the total fuel purchased during 1923 was 177,552,637 tons, and the cost of locomotive fuel during 1923 was $613,069,000. The cost of locomotive fuel represents 35 per cent of the total purchases, or 13 per cent of the total cost of transportation.

Coal is, therefore, the largest item of expense, next to labor, that the carrier is called upon to meet. When we consider the enormous expenditures for railroad fuel, we realize how important it is that each factor should be considered, carefully supervised and carried out in detail.

The principles governing the purchase of fuel are not different from those of other materials. The need is the first consideration of every purchase, the quality best suited to meet the requirements, and assurance of a regu-

lar and dependable supply. These are the three underlying factors of all purchasing, and they must be based on practical specifications and inspection. The other factors are switching, utilization of equipment, movement against traffic, and economical handling from chute, storage, etc., to the locomotive.

The specification and agreement must be combined—they are a part of each other. The first consideration for a practical specification for locomotive fuel is the character of the coal required for the property upon which it is to be used. This should be determined in relation to the type of equipment (hand or stoker fired) length of runs and other conditions under which it is operated. With accurate knowledge of these facts, the essential physical and chemical requirements of the fuel should be specified in the simplest and most explicit language. These specifications should be drawn with reference to the coal available for purchase either on the railroad or in the territory from which an adequate fuel can be economically obtained. They should clearly define coal of an objectionable nature from the standpoint of clinkering or other inherent characteristics and definitely describe the method of preparation required by the railroad.

From the standpoint of the purchasing agent, the specifications afford a basis on which he can solicit bids for fuel contracts with the assurance that the coal offered will be satisfactory to the using department if it conforms to these specifications and that all producers will have an opportunity to compete for the railroad's fuel requirements provided they can meet certain practical requirements that are clearly defined in the specifications. Fair and unrestricted competition for the railroad company's business is the basis for economy in fuel purchases. This cannot be secured without a definite standard in respect to quality as established by the specifications. If these specifications are observed the producer knows that he cannot be underbid by the producer of an inferior fuel. On the other hand he knows that his price must be in line with all competitors who can furnish fuel in accordance with these specifications.

From the standpoint of the using department the specifications afford a proper basis for the inspection of coal and insure the elimination of all fuel unsuitable for locomotive use provided they enforce these specifications. The agreement or contract for fuel purchases must specify not only the quantity of coal to be delivered and usual form language, but there must be a minimum and maximum monthly spread, and a definite and clear-cut statement of how tests shall be made in case of disagreement, and a penalty for failure to supply.

The only practical way to inspect fuel coal is to have inspectors at the mine, with authority to accept or reject coal at the tipple. The moral effect of such an arrangement is very great and its helpfulness in the proper preparation of coal is of the greatest importance. No coal should be permitted to be shipped that is not prepared in accordance with the specifications and accepted by the inspector.

Inspectors must work with and be helpful to the operators and others in developing and maintaining the proper preparation. They are in direct contact with the sources of supply and can be of the greatest assistance to a purchasing officer toward securing adequate fuel shipments, particularly when there is a shortage of coal. In this capacity, the inspector may be authorized to act for the purchasing department but his function is primarily that of protecting the interests of the using departments with respect to the quality of fuel, so he should be employed by one of the using departments, preferably the mechanical department. The danger of any other arrangement lies in the fact that under the stress of obtaining coal during a shortage or because of the desire of the representative of the purchasing department to secure a reduction in the price, defects in the coal will be overlooked and unsuitable fuel delivered to the railroad.

Arrangements for the purchase of coal should begin months in advance of its need. A thorough survey must first be made of the coal best suited for the use of the property on which it is to be used, taking into consideration not only the quality but location and dependability. Inspectors should make a thorough investigation of all fuel mines which may be acceptable, ascertaining the quality of coal, facilities for preparation, location from a switching and transportation standpoint, car rating, and all other practical features. These reports should be made to the chief purchasing officer, who will carefully review and tabulate them for future use.

The chief purchasing officer should prepare inquiries sufficiently in advance to enable free competition from all available sources. These inquiries must not only state clearly and definitely what is required, but must be accompanied by the specifications and form of agreement. Among other things they must require the bidder to state definitely the number or name of mine, its exact location, car rating, facilities for preparation, etc. Sufficient time should be allowed to permit a thorough inspection of such mines from which fuel is offered as have not already been inspected and tabulated.

After all proposals have been received, a careful survey must again be made of the entire situation and decision made on the basis of quality, dependability, car rating, location, transportation and price. None of the foregoing things are hard or complicated. On the contrary they are extremely simple and require only thoroughness and the application of common sense.

The selection of fuels available for purchase is first restricted to coal that conforms to the specification which has been prepared by the using department. This department must also be in a position to advise the chief purchasing officer in regard to the relative quality and value to the railroad of all coal that meets the requirements of the specification. Where there is considerable variation in the quality and characteristics of the acceptable fuels available for purchase, the determination of these relative values will involve a series of locomotive tests in which the results obtained from each coal can be compared under practical operating conditions. If these tests are thoroughly and conscientiously made the results may justify the payment of a premium for certain coals provided the coal tested is representative of all the coal that would be obtained upon a contract and also provided the same results could be obtained in every day use as were obtained on the test. Great discretion should be exercised in allowing any differential for one grade of coal over another when both coals are acceptable in the terms of the specification as outlined by the using department, although in principle it is admitted that under some conditions the purchase of a higher priced coal will effect ultimate fuel economy.

The next consideration is supervision of its use, and while this feature has not been assigned me to discuss, it is the outstanding factor and purpose of your association.

That your work has borne fruit has been so clearly shown that it requires no review by me. It appears that the saving accomplished by the Class I roads in 1924 as compared with 1923, solely by increased efficiency in the use of coal was $29,500,000. The saving in 1924 over 1920 was about $45,000,000, due entirely to more careful use and more economically designed locomotives.

These figures are so startling that they are almost unbelievable. To what extent greater efficiency in purchas-

ing fuel coal can add to them is, of course, problematical because results are the only factor which can be measured but that it is considerable no one will deny. The amount will depend largely on clear thinking, careful determination, fearlessness of action and coordination of effort.

Discussion

Several speakers who discussed Mr. Pearce's paper emphasized the necessity of complying with specifications where they have been established, insisting that the coal operators should be held rigidly to their contracts. The point was brought out, however, that a road must be governed somewhat by the length of haul in determining from what mines coal shall be purchased and that specifications should not be imposed that will prohibit a railroad from utilizing the resources close at hand. This was illustrated by the practice of the Baltimore & Ohio in using coal having a comparatively high sulphur content obtained on its line. This coal, it was stated, has been successfully used both on freight and passenger locomotives, in the latter case on runs of 391 miles without experiencing any difficulty from clinkering. On the Baltimore & Ohio coal samples figure largely in buying and if the coal proves acceptable to the engineer of tests the policy is simply to insist that the quality received conform to the original understanding at the time the contract was made.

Other Subjects Discussed

The sessions on Thursday were devoted to subjects primarily of interest to mechanical department officers. The convention was addressed by John Purcell and Committee reports were presented on the subjects of feed water heaters; front end grates and ash pans; stationary power plants; mechanical means for cleaning locomotive flues; Diesel locomotives; back pressure as an index to fuel economy.

Abstracts of the more important of these papers together with the result of the election of officers which took place on the last day of the convention will appear in a later issue.

"Travelers' Aid" An Important Adjunct to Railways

By Sherrard Ewing
General Director, National Association of Travelers' Aid Societies

TRAVELERS' Aid is a form of public social work very close to the everyday life of railroad men. Within a few years it has developed, in the extent of organization and the number of persons served, to be one of the foremost service agencies. Comparatively few railroad executives have been interested actively in the work and then only in that of individual local societies.

The degree to which development has been thus far carried is indicated by April statistics which show that in 165 cities, the work is on an organized basis with at least one full-time worker. Some form of service was given to 2,500,000 travelers in 1924. In 1,100 smaller places, volunteers, as co-operating representatives, give emergency service.

Societies in 90 cities have signed the Transportation Agreement, representing an annual pledge to co-operate against the evil of "passing on" indigent cases from town to town, usually at some expense to the railroads and frequently the occasion for unwarranted appeals to the sympathies of railroad men. Uniform report sheets are now utilized by 104 of these local service agencies, thus making possible evaluation and comparison of the work.

While Travelers' Aid is definitely the responsibility and duty of each community, it requires the co-operation and specialized knowledge of railroad men. Recognition of this resulted a few months ago in the election to the Board of the National Association of Travelers' Aid Societies of three men, M. J. Caples, vice-president, Seaboard Air Line; L. W. Baldwin, president, Missouri Pacific, and Marcus L. Bell, vice-president and general counsel, Chicago, Rock Island & Pacific. Subsequently, Mr. Bell was made president of the National Association and Robert S. Binkerd, vice-chairman of the Committee on Public Relations of the Eastern Railways, became a member of the National Committee on Field Work.

Special interest in Travelers' Aid service, from the railroad standpoint, lies in the assurance of safety in strange cities it affords to inexperienced passengers or their relatives. Passenger officers frequently make effective use of it in this connection. To Travelers' Aid workers are referred many cases of passengers in difficulty who have appealed to or have been noted by train crews or station men, thus freeing the railroad men of responsibility.

Because each person aided has either come from or is going to some other community, the importance of a national knitting together of this form of social work is apparent. Data being gathered and the field work being done or planned will enable the national association to lay the facts relating to Travelers' Aid work, along any railroad, before its executives.

Travelers' Aid is one of the great social work movements in which idealism and practicability are joined. But too frequently the workers' status has been confused with that of a station matron or a policewoman. The function actually is that of a counsellor to all types of travelers in difficulty—giving sound advice and helpful service and thus forming the connecting link between the traveler in need and the social resources of each community. It is essential that the temporary contacts have permanent results.

The great majority of travelers are self-reliant Americans but with them are carried thousands who, through youthful ignorance, poverty, mental incapacity or the mischances of travel, encounter difficulties in strange surroundings and who, if unaided, will frequently constitute unwelcome additions to the communities to which they wander.

Travelers' Aid Societies perform a specialized piece of work in co-operation with the Immigration Service of the United States. Young women are discharged to the Travelers' Aid worker at the seaport of entry and with the help of trainmen while in transit, each one is safeguarded to the destination city from where the Travelers' Aid of that city reports back to the Immigration Service. Commissioner General W. W. Husband recently spoke in the highest terms of this service and its twofold results in protecting the young women who come alone and in safeguarding the communities to which they go, so that they may not become a burden. Canada, Cuba, Australia and a number of European countries now maintain forms of service to travelers also.

The Travelers' Aid worker's service embraces a wide range. She gives information and direction; protects the inexperienced; saves young women and girls from mishap; advises runaways old and young; safeguards children traveling alone; discovers problems of social difficulty in many apparently casual inquiries; secures attention for aged or ill travelers; helps the confused; is a

friend and counsellor to immigrants and immigrant brides; advises in securing employment; directs travelers to lodgings; helps migrating families to a new start; watches for and assists mentally incompetent persons; and endeavors so to make temporary contacts that they will have permanent results of value.

Freight Car Loading

WASHINGTON, D. C.

LOADING of revenue freight for the week ended May 16 totaled 984,916 cars. This was the largest number of cars loaded during any one week so far this year, exceeding by 3,205 cars the previous record established during the week of May 2, and an increase of 3,546 cars over the preceding week. It was also an increase of 71,715 cars as compared with the corresponding week last year but a decrease of 7,403 cars under the corresponding week two years ago.

REVENUE FREIGHT CAR LOADING

Week Ended Saturday, May 16, 1925.

Districts	1925	1924	1923
Eastern	237,670	220,631	249,153
Allegheny	201,597	186,723	222,655
Pocahontas	49,011	37,729	39,657
Southern	141,333	131,215	135,181
Northwestern	154,186	141,157	154,735
Central Western	135,598	135,061	134,740
Southwestern	64,521	60,685	56,198
Total Western	355,305	336,903	345,673
Commodities			
Grain and grain products	35,413	37,165	33,802
Livestock	26,370	30,024	30,707
Coal	155,630	135,650	181,619
Coke	9,632	9,069	15,361
Forest products	75,995	74,281	77,716
Ore	63,651	55,383	67,054
Mdse., l. c. l.	259,076	247,334	244,723
Miscellaneous	359,149	324,295	341,337
Total	984,916	913,201	992,319
May 9	981,370	908,203	974,741
May 2	981,711	913,550	961,617
April 25	959,225	878,387	962,578
April 18	922,778	876,916	958,042
Cumulative total, twenty weeks	18,434,894	17,889,364	18,009,683

For the first 20 weeks this year—from January 1 to May 16, inclusive—18,434,894 cars have been loaded with revenue freight, the greatest number on record for any corresponding period. This exceeds by 613,699 cars or 3.4 per cent the corresponding period last year and by 425,211 cars or 2.4 per cent the corresponding period in 1923. This record traffic is being handled without car shortage. On May 14, the railroads had 330,433 surplus freight cars in good repair and immediately available for service while on the same date last year, there were 319,106 surplus freight cars. On May 14, 1923, the demand for freight cars somewhat exceeded the supply.

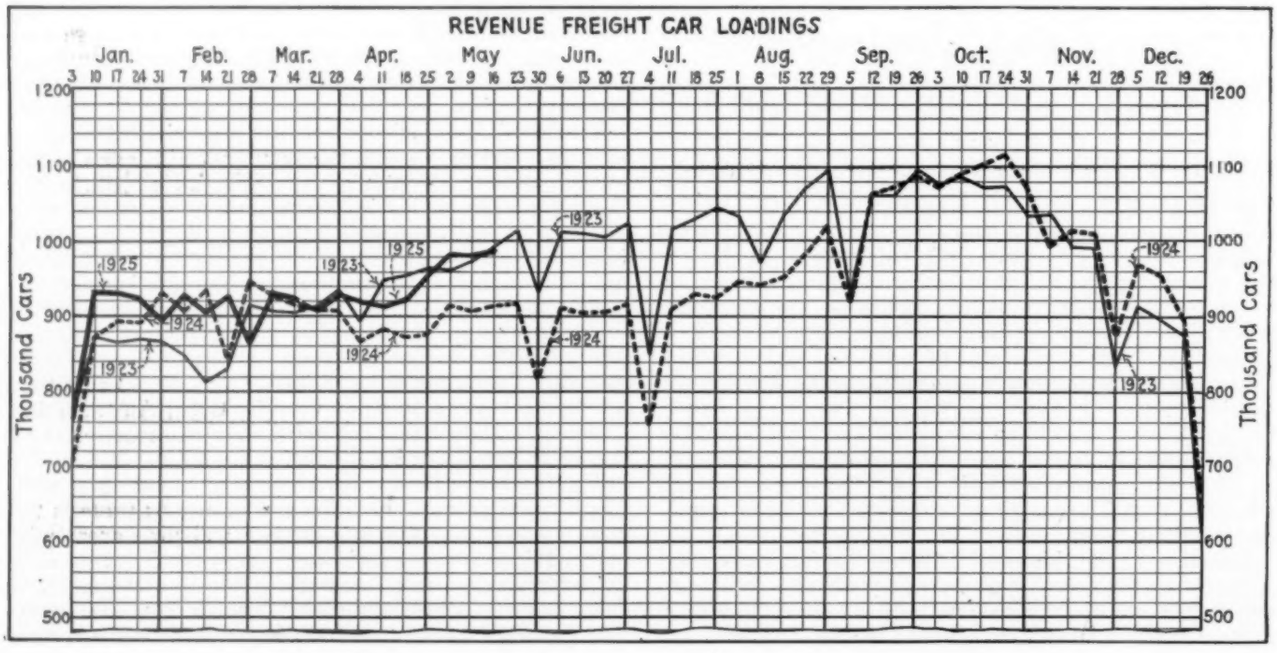
As compared with the corresponding week of last year increases in loading were shown in all districts and in all classes of commodities except grain and grain products and livestock. Coal showed an increase of 19,980 cars and miscellaneous freight an increase of 34,854 cars. The summary, as compiled by the Car Service Division, appears in the first column.

The surplus of 330,433 cars for the period May 8 to 14 included 141,258 coal cars and 140,213 box cars. The Canadian roads for the same period had a surplus of 31,870 cars, including 28,600 box cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended May 16 totalled 50,126 cars, a decrease from the previous week of 631 cars. Live stock, lumber, other forest products and miscellaneous freight showed increases, but grain loading was lighter by 630 cars and merchandise by 648 cars. Compared with the same week last year the total loading was lighter by 5,970 cars. The grain loading was less than half of last year's, showing a decrease of 5,648 cars, and coal loading was also lighter by 1,658 cars. The largest gains were in other forest products, 909 cars, merchandise, 564 cars, and miscellaneous freight, 272 cars.

	Total for Canada			Cumulative totals to date	
Commodities	May 16 1925	May 9 1925	May 17 1924	1925	1924
Grain and grain products	4,918	5,548	10,566	123,142	156,912
Live stock	2,127	2,039	2,203	44,511	43,432
Coal	1,911	2,018	3,569	83,034	96,706
Coke	184	242	180	5,851	4,992
Lumber	4,090	3,573	4,049	63,000	69,674
Pulpwood	1,588	1,693	2,133	67,289	69,551
Pulp and paper	2,091	2,171	2,005	42,170	41,900
Other forest products	2,930	2,734	2,021	60,749	58,390
Ore	1,257	1,355	1,171	23,776	20,684
Merchandise, L. C. L.	16,000	16,648	15,436	293,084	271,638
Miscellaneous	13,030	12,736	12,758	212,963	217,298
Total cars loaded	50,126	50,757	56,091	1,019,569	1,051,177
Total cars received from connections	32,187	32,694	31,692	662,616	682,201



General News Department

The Order of Railway Conductors, on the last day of its recent convention, at Minneapolis, voted to rescind the resolution previously adopted, in which the Order advocated government ownership of railroads.

The I. C. C. has granted a petition of the railroad defendants in the consolidated southwestern cases for an extension of 90 days from May 13 in which to submit certain freight traffic statistics; but the petition for postponement of oral argument in this proceeding until the statistics shall have been introduced in evidence at a subsequent hearing, has been denied.

The conference of railway executives, railway union officers, heads of employees' pension and veteran associations and prominent citizens, called by W. G. Lee, president of the Brotherhood of Railroad Trainmen, to discuss relationships between railway employees and railway managements, will meet in Cleveland, Ohio, on June 29. No definite program for the conference has been prepared as yet.

The Potomac, Fredericksburg & Piedmont, 38 miles long, a 3-ft. gage railroad extending from Fredricksburg, Va., on the Richmond, Fredericksburg & Potomac, westward to Orange, on the Southern and the Chesapeake & Ohio, has been authorized by the Corporation Commission of Virginia to go out of business. This road was opened in 1877. Its failure is due to competition of motor buses and a falling off in shipments from the timber districts on its line.

The Great Northern, through two subsidiary corporations, the Great Northern Transit Company and the Minnesota Transportation Company, each capitalized at $1,000,000, plans to operate motor buses and trucks in Minnesota for passenger and freight traffic, supplementary to the present train service. Ralph Budd, president of the Great Northern, is to be president also of the subsidiary companies. According to Mr. Budd, it has not been decided where and to what extent the railroad may desire to offer highway transportation service. After a study of the situation, highway routes will be established so as to supplement present railway service. It is understood that negotiations are now pending for the purchase by the Great Northern, of a number of highway transportation companies already in operation.

The B. & O. Staten Island Electrification Nearing Completion

The electrification of the Staten Island Rapid Transit, the Baltimore & Ohio subsidiary on Staten Island, New York, is rapidly nearing completion. The South Beach division is practically finished and it is expected that this line will begin operation under electric power on June 5. The Perth Amboy division will be ready for electric operation about one month later. A celebration of running the first electric train over each division will be held by the residents of the sections affected.

Supplement Published to the Rules of Interchange

A supplement to the current Rules of Interchange has been prepared by the Arbitration Committee of the American Railway Association containing interpretations of rules 2, 4, 17, 18, 32, 36, 43, 87, 91, 98, 101, 104, 107 and 112, and passenger car rule 10. These supplements are now available for distribution and will be supplied on requisition. A sufficient quantity has been printed to supply one copy for each copy of the Interchange Rules printed. The prices to the members of the American Railway Association are as follows: 100 copies, or more, per hundred, $1.50; 50 copies, $1; less than 50 copies, each three cents. To other than members of the American Railway Association, the supplements will be sold at six cents per copy. All remittances should be made payable to the American Railway Association, Chicago.

Canadian Press and Public Still Discuss Railway Amalgamation

Discussion of an amalgamation of the Canadian National and Canadian Pacific has for the time shifted from Parliament to the Canadian public and press. Most of the press are favorable to their continuance as friendly business rivals with the elimination of all needless duplication of services. Sir Henry Thornton, president of the Canadian National, is hopeful of this latter being accomplished, while E. W. Beatty, head of the Canadian Pacific, in an interview in London, Ontario, last week declared that the suggestions for the amalgamation of the two roads were non-political but misguided attempts to furnish a solution of Canada's transportation problems. "I do not believe," he said, "for one moment that the people of Canada would stand for the nationalization of the C. P. R., and I think they are pretty nearly right, at that."

A. S. M. E. Nominations

The Nominating Committee of the American Society of Mechanical Engineers at its recent meeting at Milwaukee, Wis., nominated the following officers for the next calendar year: President, William L. Abbott, chief operating engineer, Commonwealth Edison Company, Chicago. Vice-Presidents, A. G. Christie, professor of mechanical engineering, Johns Hopkins University, Baltimore, Md.; William T. Magruder, professor of mechanical engineering, Ohio State University, Columbus, Ohio; Roy V. Wright, managing editor, *Railway Age*, and editor, Railway Mechanical Engineer, New York. Managers, Robert L. Daugherty, professor of mechanical and hydraulic engineering, California Institute of Technology, Pasadena, Cal.; William Elmer, superintendent, Middle division, Pennsylvania Railroad Company, Altoona, Pa.; Charles E. Gorton, chairman, American Uniform Boiler Law Society, New York. Treasurer, Erik Oberg, editor, Machinery, New York.

Freight Claim Division at Kansas City

The thirty-fourth annual session of the Freight Claim Division of the American Railway Association was held in Kansas City, Mo., on May 25, 26, 27 and 28, and the attendance established a record, with a registration of 500. The reports of committees showed progress in the work of claim prevention. The meeting was devoted to committee reports, the discussion of ways and means of further minimizing loss and damage and the revision of the rules for the apportionment of claim payments between carriers.

Officers were elected as follows: Chairman, C. H. Dietrich, freight claim agent of the Chicago, Milwaukee & St. Paul, Chicago; first vice-chairman, H. R. Grochau, freight claim agent of the Chicago, St. Paul, Minneapolis & Omaha, St. Paul, Minn.; second vice-chairman, T. C. Smith, freight claim agent of the Central of New Jersey, New York. Norfolk, Va., was chosen as the place for the meeting next year.

Western Railway Club Holds Annual Dinner

Approximately 750 members and guests of the Western Railway Club attended the annual dinner of the club at the Sherman Hotel in Chicago on May 22. The following officers were elected: President, W. F. Thiehoff, general manager, Chicago, Burlington & Quincy; first vice-president, F. W. Rosser, superintendent of transportation, Erie; second vice-president, F. G. Nicholson, vice-president and general manager, Chicago & Eastern Illinois. Bruce Crandall, secretary-treasurer, was re-elected to that office. The following directors were elected: C. G. Juneau, master car builder, Chicago, Milwaukee & St. Paul; W. G. Black, super-

(*Continued on page* 1360)

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH AND THREE MONTHS OF CALENDAR YEAR 1925

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net after rents.	Net after rents, 1924.
Akron, Canton & Youngstown	Mar.	171	$236,958	$498	$246,349	$35,539	$26,620	$10,122	$70,655	$11,000	$153,936	62.50	$92,413	$79,008	$46,933	$75,605
	3 mos.	171	658,880	1,488	697,212	102,634	75,914	32,194	204,591	32,486	447,819	64.20	249,393	210,233	113,477	183,835
Alabama & Vicksburg	Mar.	141	228,370	54,170	304,826	35,259	43,950	10.017	94,747	14,518	200,388	65.70	104,438	70,904	76,679	45,026
	3 mos.	141	621,096	167,912	852,296	100,072	146,526	29,607	291,204	43,091	616,317	72.30	235,979	149,304	164,056	101,293
Vicksburg, Shreveport & Pacific	Mar.	188	274,925	60,523	359,193	50,671	58,990	11,909	125,651	16,290	265,900	74.00	93,293	67,297	63,565	23,771
	3 mos.	188	720,141	185,571	975,379	172,058	170,678	35,504	374,441	49,452	807,801	82.80	167,578	100,728	83,128	42,321
Ann Arbor	Mar.	293	420,421	25,625	462,029	28,745	94,614	10,414	205,428	15,543	354,744	76.80	107,285	100,042	77,799	72,295
	3 mos.	293	1,227,079	85,753	1,358,151	80,149	274,505	29,742	606,898	46,251	1,037,545	76.40	320,606	269,278	191,431	87,371
Atchison, Topeka & Santa Fe	Mar.	9,186	10,287,472	3,000,045	14,602,756	2,434,966	3,436,002	348,208	4,973,994	387,389	11,591,397	79.40	3,011,359	1,920,278	1,857,890	2,256,241
	3 mos.	9,183	30,463,493	9,596,627	43,793,160	5,481,249	10,044,962	1,021,693	14,882,267	1,189,273	32,397,056	74.40	11,196,104	7,556,526	7,440,052	6,785,127
Gulf, Colorado & Santa Fe	Mar.	1,908	2,025,722	245,454	2,406,382	638,623	506,611	56,739	739,955	66,463	2,008,140	83.50	398,242	310,038	177,266	—119,766
	3 mos.	1,908	6,027,602	788,348	7,231,994	1,483,368	1,531,724	154,345	2,206,122	198,552	5,572,967	77.10	1,659,027	1,400,318	1,008,394	142,983
Panhandle & Santa Fe	Mar.	858	601,997	104,570	762,307	217,625	174,828	8,028	237,771	18,796	656,836	86.20	105,471	86,583	35,998	13,373
	3 mos.	858	2,079,086	311,425	2,538,628	391,838	530,685	25,633	711,752	54,899	1,713,581	67.50	825,047	707,771	553,716	384,074
Atlanta & West Point	Mar.	93	175,107	63,925	274,708	36,724	48,750	10,220	97,438	10,409	208,344	75.80	66,364	52,196	41,865	39,732
	3 mos.	93	453,023	209,626	762,171	97,420	135,189	29,810	296,411	31,993	605,536	79.40	156,635	115,254	84,362	110,085
Western of Alabama	Mar.	133	222,810	56,678	306,718	37,244	54,802	11,035	87,991	10,885	206,556	67.30	100,162	82,652	78,544	57,068
	3 mos.	133	558,341	196,974	832,906	110,996	153,602	31,949	250,603	32,052	592,563	71.10	240,343	194,523	183,011	166,528
Atlanta, Birmingham & Atlantic	Mar.	639	392,459	37,956	460,680	85,721	99,913	22,349	182,123	16,412	406,574	88.26	54,106	43,278	14,930	27,460
	3 mos.	639	1,152,402	113,817	1,362,075	247,603	297,864	68,370	549,900	49,954	1,213,891	89.12	148,184	108,629	12,866	22,820
Atlantic Coast Line	Mar.	4,879	6,765,959	2,065,262	9,455,543	856,036	1,460,107	136,949	2,857,285	155,306	5,536,405	58.60	3,919,138	3,367,585	3,077,742	2,249,101
	3 mos.	4,872	17,007,454	6,443,555	25,322,018	2,638,345	4,042,927	426,593	8,173,943	459,884	15,959,346	63.00	9,362,672	7,908,979	7,242,980	6,601,061
Charleston & Western Carolina	Mar.	342	404,341	24,930	444,449	43,184	45,093	7,202	145,554	6,728	247,761	55.70	196,688	176,642	163,821	64,749
	3 mos.	342	961,761	77,825	1,085,586	152,081	127,535	21,304	414,631	19,307	734,858	67.70	350,728	290,573	255,548	122,587
Baltimore & Ohio	Mar.	5,292	15,418,601	2,130,702	18,793,465	2,150,196	4,694,379	377,010	6,985,029	528,322	14,894,794	79.30	3,898,671	3,050,568	2,731,915	2,911,618
	3 mos.	5,292	44,123,720	6,313,087	53,980,997	6,451,653	13,469,156	1,099,457	20,964,962	1,549,770	44,007,955	81.50	9,973,042	7,434,830	6,540,474	6,407,179
Baltimore & Ohio Chicago Term	Mar.	80	.....	.....	292,764	47,061	54,022	2,329	168,417	12,223	288,538	98.60	4,226	—31,295	73,065	4,998
	3 mos.	80	.....	.....	847,445	97,207	140,202	5,969	518,133	34,521	809,671	95.50	37,774	—78,496	198,845	22,006
Staten Island Rapid Transit	Mar.	23	100,909	103,401	224,642	45,539	30,914	2,277	130,304	14,371	223,405	99.40	1,237	—13,813	—27,670	—14,585
	3 mos.	23	274,326	298,290	623,752	122,228	91,542	5,955	376,053	43,101	638,879	102.40	—15,127	—61,909	—108,347	—64,747
Bangor & Aroostook	Mar.	616	645,478	77,433	748,940	104,669	125,866	4,490	181,876	24,475	442,443	59.10	306,497	242,085	246,561	317,033
	3 mos.	616	1,808,993	204,379	2,091,348	327,826	362,861	12,979	585,631	68,043	1,361,054	65.10	730,294	549,755	619,727	683,130
Belt Ry. Co. of Chicago	Mar.	32	.....	.....	566,359	36,534	61,880	3,073	262,461	9,961	373,909	66.00	192,450	149,921	126,137	144,099
	3 mos.	32	.....	.....	1,701,842	98,599	182,858	9,851	846,865	29,345	1,167,518	68.60	534,324	413,543	384,703	413,059
Bessemer & Lake Erie	Mar.	228	970,587	18,905	1,013,196	69,958	364,030	15,502	298,430	29,747	766,516	75.70	246,680	209,845	268,029	—11,286
	3 mo.	228	2,562,553	57,012	2,685,002	179,465	1,065,251	46,290	855,648	91,341	2,217,996	82.60	467,006	370,130	582,328	—122,284
Bingham & Garfield	Mar.	33	53,913	119	55,244	10,147	7,137	849	16,626	4,667	39,661	71.80	15,583	4,612	16,793	15,632
	3 mos.	32	150,838	238	154,398	25,327	27,245	4,533	43,235	14,263	115,335	74.70	39,063	7,120	45,728	40,668
Boston & Maine	Mar.	2,271	4,140,188	1,551,765	6,508,769	848,394	1,375,651	59,508	2,771,187	238,892	5,314,517	81.70	1,194,252	933,177	744,480	855,569
	3 mos.	2,271	11,847,331	4,893,237	19,000,993	2,562,939	4,032,005	172,899	8,316,427	721,354	15,870,208	83.50	3,130,785	2,345,291	1,722,349	1,503,568
Brooklyn Eastern District Term	Mar.	9	124,534	.....	131,748	9,991	16,120	.....	45,143	6,112	77,366	58.70	54,382	46,661	47,381	49,706
	3 mos.	9	336,861	.....	358,983	21,512	46,371	140	128,363	16,056	212,442	59.20	146,541	124,877	126,797	133,354
Buffalo & Susquehanna R. R. Corp.	Mar.	253	160,822	5,578	169,670	30,047	67,550	1,964	51,357	9,334	160,252	94.40	9,418	6,018	33,183	18,373
	3 mos.	253	508,748	16,521	534,498	92,892	202,795	5,686	163,399	29,205	493,977	92.40	40,521	28,321	118,695	106,986
Buffalo, Rochester & Pittsburgh	Mar.	590	1,068,983	119,337	1,253,956	128,855	384,052	24,930	516,996	40,848	1,098,075	97.60	155,881	120,879	135,307	72,396
	3 mos.	590	3,182,913	377,836	3,752,152	369,997	1,113,246	76,420	1,529,218	120,669	3,216,873	85.70	535,279	430,265	507,417	325,278
Canadian Pacific, Lines in Maine	Mar.	233	256,361	34,244	306,153	23,440	65,945	4,505	116,036	3,633	213,559	69.80	92,594	81,594	69,131	104,403
	3 mos.	233	714,534	96,305	859,378	72,415	163,288	14,187	352,582	11,691	614,163	71.50	245,215	212,215	176,274	224,407
Central of Georgia	Mar.	1,920	1,960,637	487,500	2,679,919	374,982	424,079	71,531	927,107	92,226	1,905,585	71.10	774,334	642,109	551,092	525,580
	3 mos.	1,920	4,985,484	1,496,735	7,204,285	1,142,834	1,289,276	202,866	2,664,206	274,668	5,582,405	77.50	1,621,880	1,298,872	1,170,766	1,252,474
Central of New Jersey	Mar.	692	3,633,317	655,306	4,593,635	476,130	1,096,344	37,550	1,792,151	110,354	3,532,078	76.90	1,061,557	700,463	596,777	572,027
	3 mos.	692	10,262,199	2,058,586	13,257,548	1,413,314	3,062,997	114,318	5,284,662	330,421	10,264,755	77.40	2,992,793	1,936,111	1,618,023	420,358
Central Vermont	Mar.	434	535,245	107,755	700,040	108,908	137,935	13,331	328,734	25,716	616,126	88.00	83,914	64,818	61,561	78,499
	3 mos.	434	1,416,023	318,720	1,895,164	312,739	367,409	41,778	969,007	73,972	1,769,501	93.40	125,663	68,237	31,456	162,443
Chesapeake & Ohio	Mar.	2,597	7,568,942	772,087	8,848,938	1,285,863	2,490,176	94,930	2,720,446	223,364	6,848,537	77.40	2,000,401	1,560,624	1,712,928	1,770,597
	3 mos.	2,598	23,102,892	2,287,631	26,639,007	3,984,608	7,072,974	308,427	8,363,102	655,957	20,478,892	76.90	6,160,115	4,840,885	5,265,772	5,070,103
Chicago & Alton	Mar.	1,055	1,683,371	479,754	2,382,299	267,231	586,911	64,996	913,546	57,485	1,894,386	79.50	487,913	389,165	250,630	522,456
	3 mos.	1,055	5,151,815	1,451,959	7,261,781	720,777	1,753,848	195,826	2,877,637	170,651	5,726,004	78.90	1,535,777	1,238,104	819,769	1,105,749
Chicago & Eastern Illinois	Mar.	945	1,570,324	341,102	2,080,880	219,857	676,488	57,516	838,353	68,157	1,876,806	90.20	204,074	103,570	532	42,033
	3 mos.	945	4,871,869	1,080,252	6,450,390	581,536	2,036,346	173,735	2,631,365	210,203	5,684,762	88.10	765,628	453,587	260,937	492,164
Chicago & Northwestern	Mar.	8,462	7,606,808	2,040,211	10,871,904	1,156,522	2,755,835	157,885	4,786,960	360,621	9,269,766	85.30	1,602,138	797,089	670,303	1,607,942
	3 mos.	8,462	22,694,179	6,269,490	32,633,329	3,325,199	8,052,463	481,089	14,492,820	1,057,929	27,547,807	84.40	5,085,522	2,675,664	1,993,942	3,513,163
Chicago, Burlington & Quincy	Mar.	9,396	9,159,247	1,773,954	12,129,252	1,098,485	2,821,906	231,400	4,592,390	372,636	9,138,996	75.30	2,990,256	2,193,363	1,866,316	2,731,868
	3 mos.	9,396	27,854,548	5,691,701	36,959,664	3,198,831	9,394,178	699,133	14,204,540	1,093,311	28,746,897	77.80	8,212,767	5,706,645	5,031,593	6,230,131
Chicago Great Western	Mar.	1,496	1,437,382	273,477	1,865,808	175,512	441,710	72,656	803,306	55,975	1,561,789	83.70	304,019	225,728	112,517	224,622
	3 mos.	1,496	4,340,801	887,949	5,695,250	510,522	1,283,730	207,306	2,473,203	165,117	4,677,994	82.10	1,017,256	767,529	404,495	438,379
Chicago, Indianapolis & Louisville	Mar.	649	1,116,479	210,959	1,464,001	140,898	281,389	36,047	525,991	33,226	1,030,401	70.40	433,600	350,861	226,688	199,529
	3 mos.	649	3,113,204	631,557	4,132,588	388,458	891,697	105,957	1,546,611	104,317	3,079,402	74.50	1,053,186	860,948	524,295	495,969

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net after rents.	Net after rents, 1924.
Chicago, Indianapolis & Louisville	Mar.	649	1,116,479	210,959	1,464,001	140,898	281,389	36,047	525,991	55,226	1,059,401	74.50	1,053,186	860,948	524,295	495,969
	3 mos.	649	3,113,204	631,557	4,132,588	388,458	891,697	105,957	1,546,611	104,317	3,079,402					
Chicago, Milwaukee & St. Paul	Mar.	11,205	$9,423,995	$1,499,397	$12,152,162	$1,294,023	$3,258,891	$185,229	$5,011,086	$390,787	$10,191,171	83.90	$1,960,991	$1,202,578	$801,983	$1,466,951
	3 mos.	11,204	28,280,400	4,671,145	36,671,695	3,528,261	9,211,069	573,791	15,539,050	1,032,324	30,019,929	81.90	6,651,766	4,377,888	3,211,798	3,467,486
Chicago, Peoria & St. Louis	Mar.	247	79,629	10,643	99,551	16,243	18,210	1,589	51,606	7,751	95,399	95.80	4,152	936	—16,446	—18,828
	3 mos.	247	259,106	33,004	318,849	46,262	62,710	5,387	160,814	24,466	299,639	94.00	19,210	8,946	—60,914	—61,444
Chicago River & Indiana	Mar.	19	.....	.....	579,852	73,303	87,305	883	242,563	12,789	416,843	71.90	163,009	125,663	230,534	287,007
	3 mos.	19	.....	.....	1,737,330	192,605	246,417	2,470	716,157	37,962	1,195,611	68.80	541,719	416,080	748,867	877,978
Chicago, Rock Island & Pacific	Mar.	7,578	7,152,958	1,840,053	9,728,064	1,084,488	2,446,140	225,988	3,960,192	307,855	8,053,917	82.80	1,674,147	1,150,018	826,003	1,164,168
	3 mos.	7,578	21,236,441	5,667,143	29,106,233	3,042,840	6,802,316	653,061	12,014,257	884,598	23,450,963	80.60	5,655,270	4,082,087	2,961,761	3,109,336
Chicago, Rock Island & Gulf	Mar.	461	414,922	68,621	528,454	80,023	80,272	15,513	219,710	16,492	415,880	78.70	112,574	99,487	81,790	106,109
	3 mos.	461	1,216,969	237,402	1,579,850	208,854	205,121	46,290	648,077	49,549	1,168,298	73.90	411,552	372,746	312,089	296,228
Chic., St. Paul, Minn. & Omaha	Mar.	1,749	1,521,290	434,581	2,104,656	202,427	454,275	27,761	962,513	75,591	1,730,092	82.20	374,564	246,603	204,191	416,797
	3 mos.	1,749	4,770,359	1,348,796	6,587,001	558,241	1,263,331	87,451	3,002,776	223,345	5,160,737	78.30	1,426,264	1,041,950	853,612	929,803
Cincinnati Indianapolis & Western	Mar.	347	331,498	27,298	389,717	44,642	81,636	15,170	165,719	18,783	326,977	83.90	62,740	45,176	15,268	16,984
	3 mos.	347	979,182	88,145	1,161,197	105,023	251,019	46,814	502,493	53,076	961,079	82.80	200,118	141,008	58,995	78,504
Clinchfield Railroad	Mar.	309	721,245	31,513	768,044	79,326	198,462	25,454	151,652	21,186	473,899	61.70	294,145	239,127	302,377	240,773
	3 mos.	309	2,106,703	98,932	2,246,920	217,028	584,733	75,432	472,553	61,885	1,408,750	62.70	838,170	673,151	903,884	638,620
Colorado & Southern	Mar.	1,056	661,576	99,586	847,019	121,968	235,933	12,503	342,800	41,265	760,365	89.80	86,654	22,966	19,443	116,517
	3 mos.	1,056	2,328,021	336,793	2,900,720	332,635	713,078	36,700	1,137,924	122,929	2,362,476	81.40	538,244	347,145	310,066	365,809
Ft. Worth & Denver City	Mar.	455	641,154	142,249	838,607	75,279	186,314	11,921	269,364	34,944	582,052	69.40	256,555	196,730	209,647	164,325
	3 mos.	455	2,166,872	474,083	2,800,825	206,171	558,835	38,311	883,902	104,241	1,807,239	64.50	993,586	815,413	842,766	711,050
Wichita Valley	Mar.	271	89,336	19,572	115,848	29,460	6,401	.....	44,785	1,508	80,972	69.90	34,876	24,140	5,682	26,148
	3 mos.	271	342,795	63,481	431,722	89,077	21,758	293	142,102	4,809	255,536	59.20	176,186	144,890	84,322	149,027
Columbus & Greenville	Mar.	167	100,593	22,464	130,029	51,171	18,682	2,675	45,746	9,819	127,879	98.30	2,150	—326	—10,933	17,838
	3 mos.	167	292,734	76,066	391,061	142,346	53,569	8,217	141,649	29,869	374,874	95.90	16,187	10,603	—22,828	38,097
Delaware & Hudson	Mar.	881	3,174,466	242,649	3,639,132	430,936	1,048,391	47,858	1,419,280	144,577	3,136,156	86.20	502,976	390,621	399,751	415,248
	3 mos.	890	9,495,203	810,654	10,985,237	1,416,160	3,018,856	140,641	4,253,475	426,237	9,350,994	85.10	1,634,243	1,296,781	1,387,243	944,501
Delaware Lackawanna & Western	Mar.	992	5,392,467	967,133	7,204,383	606,833	1,653,320	116,013	2,861,371	163,156	5,449,143	75.60	1,755,240	1,183,675	1,175,649	1,354,157
	3 mos.	992	15,297,976	3,099,410	20,770,507	1,753,242	4,879,904	348,234	8,528,974	490,520	16,149,169	77.80	4,621,338	2,973,195	2,996,643	3,218,638
Denver & Rio Grande Western	Mar.	2,566	1,804,679	324,392	2,317,032	427,934	420,327	50,232	775,055	91,525	1,797,364	77.60	519,668	351,269	424,131	348,426
	3 mos.	2,566	5,717,493	994,690	7,246,574	1,203,813	1,608,786	146,262	2,564,211	264,205	5,878,505	81.10	1,368,069	862,970	992,931	831,803
Denver & Salt Lake	Mar.	255	88,677	23,084	133,848	35,737	76,359	1,057	41,729	5,858	160,740	120.10	—26,892	—35,952	—33,052	—33,648
	3 mos.	255	634,323	69,333	766,744	115,427	276,353	3,422	247,452	17,894	660,548	86.10	106,196	79,110	81,407	—64,934
Detroit & Mackinac	Mar.	375	97,309	20,263	128,708	17,075	35,345	2,235	54,136	5,628	114,368	88.80	14,340	4,187	17,998	55,361
	3 mos.	375	266,547	72,267	372,660	49,622	106,974	6,314	163,886	17,989	344,675	92.40	27,985	—2,474	43,824	55,599
Detroit & Toledo Shore Line	Mar.	61	299,580	.....	304,797	27,833	35,587	2,760	82,468	7,318	155,966	51.10	148,831	128,196	52,468	48,688
	3 mos.	61	974,256	.....	994,515	67,412	94,937	8,556	281,517	25,485	477,907	48.00	516,608	446,278	202,933	119,343
Detroit Terminal	Mar.	26	.....	.....	191,956	19,412	15,565	.....	98,381	2,112	135,470	70.60	56,486	36,911	49,042	49,798
	3 mos.	26	.....	.....	534,525	46,009	39,667	3	286,048	5,722	377,449	70.60	157,076	97,357	117,844	161,171
Detroit, Toledo & Ironton	Mar.	470	1,090,826	6,587	1,112,752	165,320	200,960	9,356	297,470	27,068	695,367	62.50	417,385	371,278	274,502	347,183
	3 mos.	470	3,120,456	20,327	3,195,546	396,974	528,218	23,674	907,280	79,386	1,922,830	60.20	1,272,716	1,134,588	834,958	919,318
Duluth & Iron Range	Mar.	276	90,398	7,860	110,640	55,163	121,982	1,390	109,358	19,544	307,780	278.20	—197,140	—204,523	—198,485	—201,178
	3 mos.	276	287,579	25,363	353,529	149,407	348,140	3,456	325,051	55,162	882,431	249.60	—528,902	—552,093	—550,472	—610,798
Duluth, Missabe & Northern	Mar.	305	76,415	8,619	102,064	101,937	176,599	3,348	141,879	22,986	447,462	438 40	—345,398	—411,202	—415,948	—500,592
	3 mos.	305	229,350	24,675	299,953	295,171	545,516	9,962	413,179	63,880	1,329,784	443.30	—1,029,831	—1,228,254	—1,240.302	—1,485,983
Duluth Winnipeg & Pacific	Mar.	178	224,662	11,962	241,811	26,440	39,662	3,729	82,067	9,050	161,380	66.70	80,431	68,522	69,608	84,492
	3 mos.	178	609,996	35,526	666,706	71,961	113,210	12,138	253,808	23,313	475,923	71.40	190,783	157,814	176,143	191,836
Elgin, Joliet & Eastern	Mar.	459	2,103,194	18	2,325,621	149,405	624,748	11,999	806,839	42,074	1,634,907	70.30	690,714	601,469	372,333	488,708
	3 mos.	459	6,164,360	66	6,794,017	414,763	1,505,063	39,094	2,441,668	125,156	4,525,971	66.60	2,268,046	2,003,573	1,307,257	1,077,845
Erie	Mar.	2,055	6,793,972	974,925	8,508,782	967,431	2,403,464	147,494	3,509,563	290,586	7,358,166	86.50	1,150,616	782,772	962,920	1,144,731
	3 mos.	2,055	19,027,657	3,015,693	24,027,405	2,750,816	7,010,528	454,115	10,392,223	867,992	21,596,512	89.90	2,430,893	1,363,512	1,725,773	3,284,006
Chicago & Erie	Mar.	269	1,162,548	50,622	1,325,823	117,822	154,139	24,303	413,119	38,905	748,351	56.40	577,472	520,765	262,825	89,771
	3 mos.	269	3,077,366	156,319	3,491,921	316,657	465,016	72,152	1,207,655	116,103	2,177,671	62.40	1,314,250	1,153,671	338,561	258,869
New Jersey & New York	Mar.	45	26,077	99,271	130,733	18,354	23,906	1,489	70,761	3,642	118,152	90.40	12,581	8,827	—21,107	—12,047
	3 mos.	45	70,437	297,428	381,330	54,935	73,244	4,004	212,870	12,437	357,490	93.70	23,840	13,050	—77,843	—43,405
N. Y., Susquehanna & Western	Mar.	135	278,950	55,234	381,034	44,548	58,794	4,232	202,948	10,995	321,507	84.40	59,527	29,876	11,302	—69,961
	3 mos.	135	885,751	170,425	1,185,521	135,562	198,668	12,210	641,279	32,606	1,020,307	86.10	165,214	80,094	27,291	—144,228
Ev'nsville, Ind'n'polis & Terre Haute	Mar.	146	186,674	4,114	198,254	25,235	44,668	1,711	65,040	4,433	141,087	71.20	57,167	50,055	37,999	2,418
	3 mos.	146	569,663	13,018	603,399	69,596	104,571	5,127	199,881	11,948	391,315	64.90	212,084	187,105	139,554	60,922
Florida East Coast	Mar.	770	1,490,999	929,787	2,711,487	319,600	282,598	19,020	975,078	38,043	1,670,450	61.60	1,041,037	927,723	748,305	777,230
	3 mos.	770	3,964,972	2,928,588	7,730,765	969,141	852,115	73,699	2,761,221	114,086	4,876,343	63.10	2,854,422	2,508,093	1,993,281	2,054,532
Fort Smith & Western	Mar.	249	117,310	15,292	141,119	25,870	28,860	5,241	46,179	7,442	114,237	81.00	26,882	21,382	5,782	—6,013
	3 mos.	249	379,911	52,898	451,216	70,922	78,903	15,975	145,175	22,635	335,581	74.40	115,635	98,933	56,115	—36,222
Galveston Wharf Co	Mar.	13	.....	.....	158,899	54,445	3,895	944	35,021	2,819	105,621	66.50	53,278	36,278	36,079	—3,884
	3 mos.	13	.....	.....	522,721	147,734	11,229	2,654	133,783	8,211	329,779	63.10	192,942	141,899	141,356	19,841
Georgia R. R	Mar.	328	417,745	85,533	540,195	56,769	112,594	23,493	201,836	20,398	414,510	76.70	125,685	112,911	99,519	77,886
	3 mos.	328	1,123,817	256,936	1,496,526	174,365	318,718	68,681	634,910	62,318	1,258,192	84.10	238,334	200,207	175,443	249,839
Georgia & Florida	Mar.	406	136,925	15,190	160,174	22,933	19,572	8,024	56.630	8,216	115,600	72.20	44,754	38,022	17,931	29,167
	3 mos.	406	334,517	40,642	398,148	59,616	52,061	23,521	159,104	22,698	317,665	79.80	80,483	60,743	16,979	55,696

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH AND THREE MONTHS OF CALENDAR YEAR 1925—CONTINUED

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH AND THREE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of: Way and structures.	Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net after rents.	Net after rents, 1924.
Grand Trunk Western	Mar.	347	$1,241,945	$145,417	$1,455,285	$125,922	$370,563	$36,186	$575,993	$52,396	$1,165,685	80.10	$289,600	$215,527	$97,147	$127,159
	3 mos.	347	3,336,797	456,348	4,019,380	517,607	1,136,028	104,442	1,682,693	158,403	3,420,113	85.10	599,267	376,705	—62,700	163,933
Atlantic & St. Lawrence	Mar.	166	180,767	30,183	225,657	37,879	39,342	5,417	138,651	7,902	230,821	102.20	—5,164	—27,313	—91,502	—46,165
	3 mos.	166	544,319	86,213	674,776	102,377	111,969	16,054	398,213	24,158	657,910	97.50	16,866	—35,045	—243,536	—294,776
Chic., Det. & Canada Gr. Tr. Jct.	Mar.	59	220,251	5,067	267,765	12,779	11,857	4,151	80,325	3,453	112,563	42.00	155,202	141,202	115,732	158,346
	3 mos.	59	693,933	14,804	829,860	38,875	36,851	11,659	244,550	10,427	342,330	41.30	487,530	445,519	359,955	347,026
Det., Grand Haven & Milwaukee	Mar.	189	451,027	25,820	527,453	40,247	48,158	11,045	227,548	16,378	342,664	65.00	184,780	179,335	99,970	62,679
	3 mos.	189	1,172,758	91,190	1,403,856	107,317	145,446	31,426	714,197	49,100	1,046,760	74.60	357,096	341,103	69,433	154,270
Great Northern	Mar.	8,250	5,457,750	999,568	7,179,078	901,870	1,350,682	155,767	2,925,560	213,752	5,627,855	78.40	1,551,223	825,099	859,641	925,341
	3 mos.	8,250	15,928,589	3,071,125	21,085,902	2,381,791	3,972,691	461,217	8,905,152	663,451	16,632,292	78.90	4,453,610	2,274,557	2,416,045	2,145,709
Green Bay & Western	Mar.	234	102,062	11,026	122,698	22,069	15,191	4,724	44,994	2,570	89,548	72.90	33,150	25,650	17,715	32,089
	3 mos.	234	305,514	34,227	365,324	59,195	50,259	11,753	138,136	7,809	267,152	73.10	98,172	75,672	54,137	66,034
Gulf & Ship Island	Mar.	307	253,295	37,580	321,608	48,650	47,271	7,311	91,800	14,977	221,941	69.00	99,767	73,281	51,281	33,899
	3 mos.	307	733,701	114,654	939,145	127,649	131,859	22,820	262,379	48,407	628,908	56.20	311,137	226,280	177,262	154,407
Gulf, Mobile & Northern	Mar.	465	490,000	33,834	545,508	73,835	105,055	22,136	157,244	21,146	379,759	69.62	165,749	131,307	115,846	114,736
	3 mos.	465	1,374,877	109,058	1,547,557	230,624	286,019	64,953	466,008	76,698	1,125,350	72.72	422,207	330,797	288,574	291,279
Hocking Valley	Mar.	348	1,112,244	59,236	1,241,933	140,953	413,354	14,096	392,767	36,749	997,321	80.30	244,112	143,854	142,838	297,791
	3 mos.	348	3,315,729	193,516	3,711,592	382,548	1,256,774	41,861	1,213,056	110,789	3,004,852	81.00	706,740	405,713	601,544	920,131
Illinois Central	Mar.	4,875	9,355,201	2,029,217	12,332,615	1,473,341	2,688,778	188,332	4,535,490	327,261	9,270,008	75.20	3,062,607	2,018,743	2,104,395	2,609,659
	3 mos.	4,875	27,915,851	6,401,678	37,038,317	4,434,691	7,869,529	669,005	13,936,633	963,192	28,043,388	75.70	8,994,929	6,019,599	6,251,530	7,502,044
Yazoo & Mississippi Valley	Mar.	1,380	1,558,023	254,090	1,917,073	273,150	318,946	27,424	711,610	48,193	1,379,074	71.90	537,999	408,944	371,693	269,409
	3 mos.	1,380	4,576,343	830,966	5,711,705	837,101	909,001	84,535	2,076,552	141,411	4,039,275	70.70	1,672,430	1,287,350	1,196,805	959,993
Illinois Central Combined Report	Mar.	6,255	10,913,224	2,283,307	14,249,688	1,746,491	3,007,724	215,756	5,247,100	375,454	10,649,082	74.70	3,600,606	2,427,687	2,476,088	2,879,068
	3 mos.	6,255	32,492,194	7,232,644	42,750,023	5,271,792	8,778,530	753,540	16,013,185	1,104,603	32,082,663	75.00	10,667,359	7,306,949	7,448,335	8,462,037
Kansas City, Mexico & Orient	Mar.	272	220,296	5,349	232,995	42,072	67,031	5,759	80,041	116,340	311,241	133.60	—78,246	—88,844	—107,805	—25,642
	3 mos.	272	670,518	20,506	713,292	173,907	161,503	17,498	246,732	127,158	666,696	93.50	46,596	15,998	—61,847	—73,447
Kan. City, Mex. & Orient of Tex.	Mar.	465	227,918	12,957	249,941	49,443	56,951	6,064	87,674	5,516	205,648	82.30	44,293	37,106	21,546	—35,711
	3 mos.	465	759,559	39,331	827,689	132,622	154,934	18,563	257,931	16,431	580,462	70.10	247,227	226,040	165,240	—27,959
Kansas City Southern	Mar.	773	1,291,762	118,849	1,535,852	196,047	278,796	42,473	480,429	72,244	1,069,491	69.60	466,361	372,105	354,327	195,398
	3 mos.	773	3,518,872	367,350	4,263,761	517,855	801,191	129,329	1,429,562	223,308	3,100,602	72.70	1,163,159	880,953	825,715	770,001
Texarkana & Ft. Smith	Mar.	81	199,943	11,239	226,390	19,798	17,163	5,354	65,815	9,440	118,241	52.20	108,149	92,247	75,400	110,902
	3 mos.	81	614,051	32,873	693,026	77,171	57,808	15,025	198,051	27,473	379,851	54.80	313,175	265,656	183,984	262,964
Kansas, Oklahoma & Gulf	Mar.	314	160,516	6,848	173,456	61,374	33,186	8,949	75,372	3,488	182,169	105.00	—8,713	—17,370	—27,477	6,217
	3 mos.	314	471,254	23,760	512,029	166,773	93,307	25,660	215,469	23,157	524,127	102.40	—12,098	—39,658	—69,471	18,994
Lake Superior & Ishpeming	Mar.	161	58,880	5,893	67,830	26,414	26,121	471	35,363	4,521	92,890	136.90	—25,060	—36,460	—41,014	—29,302
	3 mos.	161	189,547	17,324	217,522	75,162	81,374	1,516	109,024	14,156	281,232	129.30	—63,710	—97,814	—110,742	—108,797
Lake Terminal	Mar.	13	.....	.....	87,803	14,877	18,599	.....	53,262	1,721	88,459	100.70	—656	—6,890	—7,028	—1,990
	3 mos.	13	.....	.....	266,791	37,320	54,061	.....	158,353	5,163	254,897	95.50	11,894	—6,808	—2,871	—40,438
Lehigh & Hudson River	Mar.	95	240,876	2,730	255,081	26,860	53,525	2,188	94,913	9,482	186,968	73.30	68,113	54,705	29,903	73,613
	3 mos.	96	699,471	8,890	749,349	78,503	142,056	5,985	303,134	27,917	557,595	74.40	191,754	154,484	80,786	131,691
Lehigh & New England	Mar.	219	375,849	1,719	384,414	41,357	103,218	5,424	130,619	20,192	300,729	78.20	83,685	69,816	73,092	47,961
	3 mos.	219	1,113,169	5,867	1,139,425	131,853	332,609	16,777	399,906	58,193	939,930	82.40	200,395	164,244	188,627	184,189
Lehigh Valley	Mar.	1,374	5,557,461	538,720	6,625,860	691,436	1,285,259	112,839	2,597,626	134,625	4,846,018	73.10	1,779,842	1,410,594	1,304,489	1,264,425
	3 mos.	1,374	15,072,420	1,695,026	18,198,409	2,097,901	3,845,218	337,286	7,709,110	407,345	14,471,800	79.50	3,726,609	2,814,352	2,411,488	2,222,356
Louisiana & Arkansas	Mar.	302	291,839	24,725	323,971	54,841	64,678	10,074	93,121	11,915	233,507	72.00	90,464	62,876	50,722	51,744
	3 mos.	302	863,239	77,061	962,999	170,283	188,465	31,365	282,477	35,787	706,216	73.30	256,783	174,235	140,071	153,662
Louisiana Ry. & Nav. Co.	Mar.	337	276,044	16,560	313,605	78,268	50,033	10,508	133,303	9,849	280,553	89.40	33,052	13,191	—14,275	—44,779
	3 mos.	337	776,504	51,485	896,200	222,588	142,648	31,958	408,313	30,441	832,494	92.80	63,706	3,276	—89,145	—81,134
Louisiana Ry. & Nav. Co. of Tex.	Mar.	206	101,746	7,742	116,303	22,016	20,109	2,665	61,569	5,115	111,474	95.80	4,829	1,020	—16,329	—16,733
	3 mos.	206	294,201	24,374	339,958	65,601	53,721	9,283	159,632	16,470	304,707	89.60	35,251	23,442	—27,391	—56,629
Louisville & Nashville	Mar.	5,044	8,818,071	1,722,342	11,243,633	1,588,532	2,660,221	243,805	4,046,315	271,243	8,852,810	78.70	2,390,823	1,867,750	1,865,328	1,852,261
	3 mos.	5,044	26,826,824	5,426,930	34,231,002	4,720,630	8,114,492	744,236	12,457,765	782,344	26,941,132	78.70	7,289,870	5,721,951	5,681,145	4,569,506
Louisville, Henderson & St. Louis	Mar.	199	252,332	51,809	321,760	51,286	41,584	6,617	98,928	10,076	208,491	64.80	113,269	93,897	78,037	55,538
	3 mos.	199	784,787	156,539	993,903	140,692	137,091	21,088	311,426	28,852	639,149	64.30	354,754	294,460	244,130	189,332
Maine Central	Mar.	1,207	1,361,528	341,732	1,848,891	262,384	352,032	12,633	680,423	48,273	1,355,725	73.30	493,166	392,737	385,479	284,835
	3 mos.	1,207	3,733,593	968,106	5,125,498	754,117	995,405	37,005	2,085,482	148,307	4,019,932	78.40	1,105,566	804,291	759,562	567,548
Midland Valley	Mar.	364	305,500	39,055	356,980	66,743	51,819	6,488	108,676	20,520	252,143	70.60	104,837	87,974	72,387	112,610
	3 mos.	364	898,670	125,968	1,067,543	137,027	138,558	18,580	326,519	57,459	675,120	63.20	392,423	342,006	291,262	319,132
Minneapolis & St. Louis	Mar.	1,638	1,027,655	104,926	1,197,173	198,359	274,591	30,703	576,228	54,817	1,131 883	94.50	65,290	900	—63,167	42,781
	3 mos.	1,638	3,264,220	349,422	3,813,494	425.694	793.067	91,191	1,818,299	156,186	3,280,156	86.00	533,338	335,130	151,682	171,385
Minneapolis, St. Paul & S. S. Marie	Mar.	4,403	2,786,078	451,495	3,514,535	455,532	698,060	67,548	1,500,186	110,389	2,842,902	80.90	671,633	429,534	328,468	217,134
	3 mos.	4,403	8,117,980	1,459,681	10,346,307	1,308,056	2,124,017	197,286	4,453,907	327,395	8,534,103	82.50	1,812,204	1,095,133	720,912	388,971
Duluth, South Shore & Atlantic	Mar.	591	328,773	85,701	444,951	52,078	80,007	6,316	201,226	10,351	355,328	79.90	89,623	60,618	40,507	23,372
	3 mos.	591	981,023	268,946	1,340,338	147,902	274,177	19,933	595,611	33,073	1,086,056	81.00	254,282	165,377	104,412	63,049

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH AND THREE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net after rents.	Net after rents, 1924.
Spokane International	Mar.	165	$77,802	$13,661	$96,360	$13,643	$8,464	$3,111	$32,797	$6,433	$65,434	67.90	$30,926	$25,697	$18,648	$26,672
	3 mos.	165	215,367	37,198	268,496	34,209	21,191	9,446	97,920	20,230	186,316	69.40	82,180	66,530	45,520	54,669
Mississippi Central	Mar.	164	114,247	11,491	130,535	16,311	21,599	6,874	33,622	7,282	85,688	65.60	44,847	32,353	34,191	38,054
	3 mos.	192	333,727	36,602	386,339	52,791	66,700	20,803	115,446	25,378	281,118	56.90	105,221	78,590	83,041	117,471
Missouri & North Arkansas	Mar.	364	114,076	14,729	137,708	25,288	29,635	6,102	53,033	6,325	120,383	87.40	17,325	14,958	4,710	4,209
	3 mos.	364	314,917	46,859	387,551	78,780	69,045	15,750	158,563	20,931	343,069	88.50	44,482	37,027	9,371	—10,588
Missouri-Kansas-Texas	Mar.	1,799	2,157,557	360,274	2,736,164	257,768	602,236	52,783	755,617	92,760	1,770,192	64.70	965,972	776,949	769,399	798,951
	3 mos.	1,799	6,434,760	1,187,154	8,265,644	801,988	1,771,387	156,313	2,327,784	268,428	8,359,487	64.80	2,906,157	2,302,712	2,356,000	2,068,382
Mo., Kansas, Texas of Texas	Mar.	1,389	1,365,066	340,239	1,851,057	251,351	273,639	40,308	700,223	67,946	1,329,917	71.80	521,140	442,161	242,474	13,149
	3 mos.	1,389	4,112,179	1,062,718	5,642,573	731,488	902,509	123,458	2,217,667	200,117	4,191,831	74.30	1,451,142	1,266,697	629,588	319,788
Missouri Pacific	Mar.	7,338	8,613,421	1,291,800	10,712,493	1,543,680	2,324,765	228,089	4,090,112	338,404	8,571,881	80.00	2,140,612	1,716,577	1,231,769	1,113,798
	3 mos.	7,337	25,340,721	4,014,663	31,777,896	4,185,074	6,651,477	715,779	12,649,413	971,701	25,347,983	79.80	6,429,913	5,162,023	3,602,296	3,069,331
International-Great Northern	Mar.	1,159	1,117,499	173,685	1,449,798	276,593	238,301	38,692	565,148	53,264	1,163,607	80.26	286,191	219,200	136,771	116,900
	3 mos.	1,159	3,276,691	525,605	4,264,993	793,758	720,236	112,047	1,654,946	153,487	3,397,346	79.42	867,647	727,121	425,920	307,492
Texas & Pacific	Mar.	1,952	2,085,274	500,744	2,796,175	422,335	575,818	62,559	1,055,390	91,093	2,217,378	79.30	578,797	438,612	400,503	321,582
	3 mos.	1,952	6,089,750	1,538,122	8,237,580	1,179,551	1,638,375	186,399	3,097,036	269,921	6,384,685	77.50	1,852,895	1,431,844	1,184,925	1,216,486
Mobile & Ohio	Mar.	1,161	1,437,917	128,970	1,666,910	213,556	285,716	50,986	583,348	45,303	1,179,577	70.80	487,333	401,677	346,130	299,009
	3 mos.	1,161	4,002,741	412,661	4,688,161	643,856	847,103	146,421	1,680,106	133,568	3,451,625	73.60	1,236,536	977,317	789,245	887,757
Monongahela	Mar.	132	394,908	26,397	426,140	62,500	65,000	1,123	117,977	8,984	255,584	60.00	170,556	154,435	100,944	59,065
	3 mos.	132	1,283,328	79,712	1,374,826	187,500	195,000	3,860	386,256	29,912	801,502	58.30	573,324	524,982	338,653	249,240
Monongahela Connecting	Mar.	7	.....	.....	221,545	25,915	48,320	374	110,070	3,217	187,896	84.80	33,648	28,784	29,843	18,115
	3 mos.	7	.....	.....	649,305	70,420	137,615	1,124	342,910	10,785	562,854	86.70	86,450	71,802	71,072	23,350
Montour	Mar.	57	88,939	963	90,942	22,423	51,382	1,121	27,685	7,434	110,045	121.10	—19,203	—21,931	8,610	19,529
	3 mos.	57	313,148	2,793	318,637	59,953	143,811	3,072	93,062	22,047	321,945	101.00	—3,308	—18,016	78,617	94,280
Nashville, Chattanooga & St. Louis	Mar.	1,259	1,556,949	372,593	2,089,031	330,781	447,928	77,194	739,526	73,880	1,678,698	80.40	410,333	351,126	328,365	333,349
	3 mos.	1,259	4,274,581	1,202,493	5,951,523	833,232	1,327,087	233,215	2,165,175	213,655	4,814,713	80.90	1,136,910	956,388	910,981	729,385
Nevada Northern	Mar.	165	69,868	8,792	84,449	19,592	7,797	1,155	18,534	6,121	53,199	63.00	31,250	20,774	21,226	36,062
	3 mos.	165	203,196	25,279	246,084	53,899	25,496	2,996	54,535	15,472	152,398	61.90	93,686	62,257	62,370	101,480
Newburgh & South Shore	Mar.	7	.....	.....	168,237	10,567	42,337	.....	70,135	4,388	127,427	75.70	40,810	28,020	27,280	10,887
	3 mos.	7	.....	.....	523,254	34,769	114,917	.....	222,976	15,584	388,246	74.20	135,008	96,025	103,472	29,639
New Orleans Great Northern	Mar.	274	207,508	24,601	239,880	36,321	37,863	7,995	80,200	11,885	174,288	72.70	65,592	46,307	36,205	50,019
	3 mos.	274	621,375	72,353	719,793	101,523	117,582	20,086	229,831	32,570	501,638	69.70	218,155	158,750	125,280	141,023
New York Central	Mar.	6,822	19,358,184	6,836,006	30,325,243	3,481,387	6,525,352	363,902	11,329,340	992,860	23,646,031	76.00	7,279,212	5,066,293	4,772,741	5,803,222
	3 mos.	6,822	55,905,477	21,342,200	88,117,778	10,362,320	19,258,532	1,094,531	34,632,370	2,750,989	69,212,995	78.50	18,904,783	12,868,662	12,350,739	14,259,606
Cincinnati Northern	Mar.	244	321,224	8,227	336,971	30,763	61,539	5,319	129,336	9,660	236,617	70.20	100,354	78,113	62,398	104,036
	3 mos.	244	1,044,078	26,163	1,083,636	113,448	200,996	18,684	380,112	28,496	741,725	68.10	346,911	277,905	199,781	253,669
Cleve., Cin., Chic. & St. Louis	Mar.	2,398	5,350,212	1,174,044	7,111,924	788,256	1,458,687	121,668	2,689,656	207,810	5,319,159	74.80	1,792,765	1,356,822	1,358,188	1,446,757
	3 mos.	2,398	16,411,343	3,669,884	21,787,640	2,181,452	4,473,133	355,880	8,306,596	604,279	16,083,426	73.80	5,704,214	4,375,544	4,149,466	3,245,615
Indiana Harbor Belt	Mar.	116	.....	.....	951,191	87,202	145,771	4,676	414,132	23,976	675,702	71.00	275,489	229,388	124,324	106,723
	3 mos.	116	.....	.....	2,732,750	237,438	385,782	16,366	1,273,746	67,905	1,981,029	72.50	751,721	646,091	298,164	228,576
Michigan Central	Mar.	1,862	5,211,166	1,407,015	7,382,858	790,749	1,624,838	111,718	2,525,309	160,260	5,285,268	71.60	2,097,590	1,656,487	1,728,447	2,038,991
	3 mos.	1,862	14,477,142	4,457,316	21,002,585	2,187,428	4,391,188	316,081	7,508,009	472,818	15,102,448	71.90	5,900,137	4,639,472	4,729,362	5,085,298
Pittsburgh & Lake Erie	Mar.	231	2,532,975	241,629	2,867,594	332,778	897,242	21,546	945,593	74,181	2,270,512	79.20	597,082	423,091	770,216	1,039,234
	3 mos.	231	7,639,259	719,137	8,639,899	1,031,989	2,607,721	70,281	2,837,392	221,114	6,767,782	78.30	1,872,117	1,328,957	2,507,489	2,670,170
New York, Chicago & St. Louis	Mar.	1,695	4,316,334	136,750	4,604,142	503,961	839,762	115,994	1,628,172	155,507	3,162,306	68.70	1,441,836	1,193,661	1,084,254	1,019,342
	3 mos.	1,695	12,511,555	395,176	13,336,935	1,507,136	2,542,154	357,677	4,919,440	487,107	9,742,891	73.10	3,594,044	2,848,752	2,582,351	2,197,665
N. Y., New Haven & Hartford	Mar.	1,957	5,592,453	3,731,419	10,569,799	1,046,205	2,416,817	74,204	3,978,802	280,213	7,944,718	75.20	2,625,081	2,295,106	1,792,566	1,903,145
	3 mos.	1,957	15,536,560	11,598,109	30,516,991	2,973,270	6,826,639	202,819	11,791,256	870,374	23,143,743	75.80	7,373,248	6,206,489	4,816,769	4,239,953
Central New England	Mar.	292	601,043	10,091	634,250	81,620	113,154	5,867	206,631	13,939	421,211	66.40	213,039	187,539	147,190	139,712
	3 mos.	292	1,812,381	31,963	1,908,066	231,906	325,608	16,367	640,910	43,030	1,257,804	65.90	650,262	573,750	450,558	388,275
New York Connecting	Mar.	20	199,993	.....	230,646	6,412	12,558	.....	43,711	1,139	64,820	28.10	165,826	124,576	110,811	108,885
	3 mos.	20	614,525	.....	691,573	21,881	26,229	.....	154,632	4,002	206,744	29.90	484,829	364,579	336,078	311,733
New York, Ontario & Western	Mar.	569	519,546	78,862	758,993	115,949	201,343	17,412	418,988	36,393	791,524	104.30	—32,531	—78,637	—115,973	21,987
	3 mos.	569	1,860,198	258,169	2,581,539	365,917	630,964	49,946	1,382,645	110,623	2,532,533	98.90	29,206	—109,012	—213,825	—76,766
Norfolk & Western	Mar.	2,240	6,897,033	621,408	7,846,360	1,146,367	1,770,487	101,804	2,328,664	179,995	5,542,179	70.60	2,304,181	1,704,003	1,869,685	1,836,546
	3 mos.	2,240	21,037,224	1,940,528	23,908,618	3,129,329	5,337,145	289,585	7,133,911	524,562	16,448,170	68.80	7,460,448	5,659,631	6,295,655	3,790,115
Norfolk Southern	Mar.	931	797,602	74,216	918,432	101,067	130,336	23,421	325,344	29,018	612,554	66.70	305,878	257,696	204,183	190,793
	3 mos.	931	1,866,903	246,046	2,241,116	287,501	295,009	68,961	902,356	84,878	1,640,152	73.20	600,964	460,448	353,501	377,377
Northern Pacific	Mar.	6,694	5,460,140	927,679	7,017,433	956,648	1,599,046	159,730	2,697,824	262,871	5,746,489	81.90	1,270,944	602,919	979,283	1,310,556
	3 mos.	6,694	15,756,240	2,824,879	20,408,977	2,408,072	4,511,247	480,762	8,386,873	762,045	16,803,936	82.30	3,605,041	1,604,588	2,599,640	3,286,747

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH AND THREE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net after rents.	Net after rents, 1924.
Northwestern Pacific	Mar.	480	$293,547	$154,188	$497,062	$99,958	$92,517	$6,657	$229,701	$18,112	$446,921	89.90	$50,141	$4,215	—$4,546	$20,476
	3 mos.	480	821,737	429,405	1,388,988	276,396	247,795	15,853	651,836	52,936	1,244,522	89.60	144,466	5,425	—23,474	—37,641
Pennsylvania R. R.	Mar.	10,507	36,518,011	11,161,939	52,522,631	6,466,187	14,335,941	641,962	20,578,148	1,517,238	44,243,185	84.20	8,279,446	5,894,628	4,813,475	7,168,588
	3 mos.	10,507	107,551,400	34,183,665	155,648,580	19,286,534	41,785,196	1,918,919	61,871,871	4,512,521	131,637,844	84.60	24,010,736	18,240,747	14,719,049	18,798,503
Baltimore, Chesapeake & Atlantic	Mar.	130	69,526	24,393	100,074	12,193	31,111	1,760	74,828	3,988	123,880	123.80	—23,806	—26,774	—28,667	—22,300
	3 mos.	130	180,018	64,599	262,014	30,673	92,900	4,567	220,763	10,429	359,332	137.10	—97,318	—97,357	—103,382	—59,892
Long Island	Mar.	397	863,773	1,559,215	2,627,977	370,593	567,259	20,588	1,282,416	75,555	2,262,056	86.10	365,921	366,954	230,712	223,009
	3 mos.	397	2,303,040	4,553,459	7,445,487	1,079,053	1,444,171	60,183	3,767,620	211,333	6,588,640	88.50	856,847	726,856	576,037	536,448
West Jersey & Seashore	Mar.	360	400,563	473,258	926,715	162,290	170,032	12,291	457,856	24,161	827,149	89.30	99,566	83,355	61,280	7,586
	3 mos.	360	1,075,941	1,331,964	2,560,790	486,825	505,661	35,906	1,344,925	71,575	2,446,526	95.50	114,264	114,100	38,638	—61,291
Peoria & Pekin Union	Mar.	19	34,198	3,654	168,393	12,833	15,643	971	78,012	8,398	115,857	68.80	52,536	36,536	57,278	62,674
	3 mos.	19	94,604	11,529	533,117	35,970	64,649	2,426	250,687	24,826	378,558	71.00	154,559	106,559	161,893	186,063
Pere Marquette	Mar.	2,263	2,641,463	311,858	3,168,055	328,016	769,092	53,057	1,216,361	97,415	2,457,875	77.60	710,180	590,118	491,479	694,862
	3 mos.	2,264	7,697,033	1,002,225	9,341,032	820,528	2,205,260	157,408	3,713,769	300,183	7,207,688	77.20	2,133,344	1,723,112	1,600,785	1,542,954
Pittsburgh & Shawmut	Mar.	102	88,860	7,285	98,108	14,733	32,198	1,421	30,840	6,564	85,756	87.40	12,352	12,047	17,468	—2,704
	3 mos.	102	278,679	19,891	304,857	41,639	100,750	4,183	97,179	19,971	263,722	86.50	41,135	40,492	63,818	18,544
Pittsburgh & West Virginia	Mar.	92	313,026	8,619	356,556	29,094	108,182	5,347	73,787	15,661	243,976	68.40	112,580	73,093	121,840	117,901
	3 mos.	92	970,084	23,754	1,097,453	84,968	292,888	16,949	227,292	60,943	716,218	65.30	381,235	260,576	436,130	353,725
Pittsburgh, Shawmut & Northern	Mar.	210	138,657	4,380	145,920	21,047	39,856	1,772	54,158	5,492	122,325	83.80	23,595	20,920	19,009	—5,714
	3 mos.	210	415,300	14,045	437,850	58,836	105,918	5,121	168,132	16,499	354,506	81.00	83,344	75,361	69,871	—46,665
Quincy, Omaha & Kansas City	Mar.	250	44,712	18,369	70,092	27,319	14,920	763	68,034	3,069	113,980	162.60	—43,888	—48,521	—51,036	4,182
	3 mos.	250	125,627	55,242	203,720	56,196	49,213	2,586	146,510	8,496	262,282	128.70	—58,562	—72,460	—81,110	—39,185
Reading Company	Mar.	1,139	6,368,891	792,866	7,537,578	952,594	1,880,145	67,997	2,866,558	203,708	5,968,770	79.20	1,568,808	1,206,957	1,314,848	1,527,943
	3 mos.	1,139	19,086,684	2,574,351	22,718,369	2,493,193	5,317,164	197,439	8,817,552	539,959	17,329,097	76.30	5,389,272	4,280,182	4,531,992	4,240,464
Atlantic City	Mar.	169	134,152	136,603	285,998	80,043	39,338	5,044	193,490	4,755	322,749	112.90	—36,751	—59,447	—84,995	—69,898
	3 mos.	169	367,348	371,601	779,813	299,255	163,910	13,425	547,960	11,927	1,009,853	129.50	—230,040	—298,128	—373,142	—358,618
Perkiomen	Mar.	41	81,808	4,870	90,754	11,084	5,383	112	46,253	748	63,620	70.10	27,134	22,056	16,918	34,304
	3 mos.	41	269,519	18,516	299,521	27,592	15,789	325	136,808	2,381	183,031	61.10	116,490	101,077	86,057	94,728
Port Reading	Mar.	19	147,866	.....	181,843	17,758	5,492	229	67,749	5,647	96,864	53.30	84,979	65,392	27,322	17,960
	3 mos.	19	496,374	.....	614,503	44,156	17,211	687	228,068	8,492	298,603	48.60	315,900	265,589	102,682	14,108
Richmond, Fred'ksburg & Potomac	Mar.	117	525,124	451,989	1,179,966	100,616	167,101	8,486	364,464	32,769	710,500	60.20	469,466	399,083	320,704	238,295
	3 mos.	117	1,393,324	1,273,867	3,222,112	256,238	486,523	26,527	1,040,161	101,635	2,008,068	62.30	1,214,044	1,022,885	824,200	700,028
Rutland	Mar.	413	302,137	97,914	502,936	85,959	116,302	10,009	214,409	14,163	442,468	88.00	60,468	38,702	45,830	119,570
	3 mos.	413	866,271	303,564	1,460,799	263,561	344,239	27,807	690,463	43,089	1,372,979	94.00	87,820	22,134	67,934	194,245
St. Louis-San Francisco	Mar.	4,902	5,340,373	1,231,834	7,026,060	787,740	1,407,655	102,352	2,492,950	230,690	5,001,082	71.20	2,024,978	1,665,842	1,663,474	1,529,924
	3 mos.	4,902	15,626,185	3,957,487	20,900,162	2,235,851	4,040,817	301,411	7,484,040	676,753	14,696,858	70.30	6,203,304	5,080,194	4,981,704	4,545,165
Ft. Worth & Rio Grande	Mar.	233	83,300	19,814	112,490	23,829	18,866	3,293	57,221	5,014	107,612	95.70	4,878	786	—4,121	—14,679
	3 mos.	233	270,717	56,270	358,011	60,719	66,727	9,304	169,572	14,245	319,910	89.40	38,101	25,951	—2,177	—3,323
St. Louis, San Francisco & Tex.	Mar.	137	145,707	11,508	161,793	21,302	29,937	5,075	63,231	7,300	126,841	78.40	34,952	32,614	3,963	—27,585
	3 mos.	137	505,859	39,694	562,407	68,142	84,412	15,227	191,338	21,925	381,038	67.80	181,369	174,038	99,804	—3,454
St. Louis Southwestern	Mar.	940	1,350,910	120,159	1,558,569	248,732	368,521	50,506	382,487	61,235	1,127,655	72.40	430,914	379,020	311,057	323,916
	3 mos.	950	4,002,284	381,476	4,634,291	691,307	1,020,605	152,758	1,145,135	185,325	3,243,026	70.00	1,391,265	1,208,508	958,511	1,070,631
St. Louis Southwestern of Texas	Mar.	807	512,916	62,629	626,597	147,182	198,894	22,435	251,821	32,576	655,325	104.60	—28,728	—56,286	—13,035	—38,497
	3 mos.	807	1,597,319	205,183	1,946,969	425,659	573,965	68,128	781,265	93,216	1,948,872	100.10	—1,903	—83,411	39,479	6,834
San Antonio & Aransas Pass	Mar.	739	445,958	45,790	523,774	148,713	145,584	10,433	210,128	22,124	536,004	102.30	—12,230	—28,639	—52,325	—11,373
	3 mos.	739	1,269,761	148,618	1,518,693	433,789	432,402	32,726	623,094	67,926	1,587,235	104.50	—68,542	—118,163	—170,301	22,061
San Antonio, Uvalde & Gulf	Mar.	318	95,371	16,368	123,839	21,582	17,635	4,680	57,353	5,786	107,036	86.40	16,803	12,875	5,905	—4,907
	3 mos.	318	318,398	51,321	402,629	65,128	48,226	14,984	166,001	18,595	312,934	77.70	99,695	78,220	43,653	11,929
Seaboard Air Line	Mar.	3,778	4,128,117	1,008,164	5,688,049	577,488	820,871	175,963	2,091,512	172,214	3,926,618	69.00	1,761,431	1,530,161	1,274,484	1,111,187
	3 mos.	3,741	10,533,874	3,316,012	15,441,471	1,889,997	2,565,398	508,949	5,921,163	515,671	11,661,038	75.50	3,780,433	3,106,747	2,522,821	2,734,995
Southern Ry.	Mar.	6,868	9,371,886	2,284,943	12,604,504	1,736,445	2,103,621	239,702	4,253,639	322,499	8,741,023	69.40	3,863,481	3,108,827	3,012,902	2,373,080
	3 mos.	6,868	25,591,894	7,263,175	35,595,766	4,929,633	6,344,687	707,121	12,604,941	937,174	25,783,166	72.40	9,812,600	7,708,467	7,300,381	6,054,491
Alabama Great Southern	Mar.	318	698,184	145,765	896,074	111,707	180,695	19,357	268,081	22,351	608,829	67.90	287,245	247,605	263,173	253,136
	3 mos.	318	1,877,165	447,827	2,468,571	333,445	524,573	60,695	784,762	73,002	1,796,798	72.80	671,773	536,494	594,614	542,558
Cin., New Orleans & Texas Pacific	Mar.	338	1,456,379	329,358	1,898,058	229,024	377,256	37,907	542,088	52,377	1,258,133	66.30	639,925	566,076	565,636	530,046
	3 mos.	338	4,174,068	1,120,152	5,601,110	651,434	1,075,305	120,420	1,629,822	149,682	3,678,572	65.70	1,922,538	1,681,059	1,659,821	1,345,833
Georgia Southern & Florida	Mar.	401	309,414	111,405	470,286	64,267	71,203	9,854	171,207	10,511	333,751	71.00	136,535	112,261	56,511	42,878
	3 mos.	401	893,078	378,913	1,450,208	196,305	175,872	29,076	519,303	30,558	971,118	67.00	479,000	401,088	241,095	130,406
New Orleans & Northeastern	Mar.	207	409,187	77,039	524,723	64,922	79,583	10,570	150,861	14,487	324,253	61.80	200,470	152,939	134,663	120,968
	3 mos.	207	1,125,896	232,541	1,456,378	186,886	226,566	32,686	430,584	45,494	933,979	64.10	522,399	386,646	327,284	318,154

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MARCH AND THREE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net after rents.	Net after rents, 1924.
Northern Alabama	Mar.	110	$125,865	$11,085	$139,797	$19,345	$4,848	$2,061	$40,850	$3,408	$70,512	50.40	$69,285	$63,160	$32,607	$15,068
	3 mos.	110	342,652	32,302	382,728	65,013	14,465	6,422	116,627	9,572	212,099	55.40	170,629	155,254	72,155	98,842
Southern Pacific	Mar.	8,722	11,700,450	3,558,628	16,818,164	2,543,156	3,046,305	295,955	5,970,487	566,222	12,562,202	74.70	4,255,962	2,843,355	2,750,051	2,588,505
	3 mos.	8,722	31,464,859	10,017,583	45,820,749	7,080,782	8,739,725	940,261	17,136,393	1,612,744	36,139,970	78.90	9,680,779	5,554,342	5,555,728	6,648,796
Atlantic Steamship Lines	Mar.	....	811,768	36,444	986,855	16,851	200,348	19,566	731,360	29,511	997,636	101.10	—10,781	—25,291	—22,071	79,642
	3 mos.	....	2,276,365	110,146	2,769,272	42,712	521,288	62,450	2,353,000	86,833	3,066,283	110.70	—297,011	—341,234	—342,214	179,704
Galveston, Harrisb'g & S. Antonio	Mar.	1,379	1,492,946	383,664	2,015,212	359,653	423,159	39,972	687,683	89,911	1,620,213	80.40	394,999	357,180	340,974	220,497
	3 mos.	1,379	4,187,630	1,176,071	5,774,751	1,016,820	1,181,298	139,279	1,986,261	266,497	4,647,284	80.50	1,127,467	943,757	761,868	520,762
Houston & Texas Central	Mar.	929	909,571	242,156	1,234,360	303,663	232,232	31,768	397,782	49,323	1,015,444	82.30	218,916	165,070	137,484	47,601
	3 mos.	929	3,080,849	776,004	4,097,838	778,167	723,652	89,243	1,302,494	138,217	3,036,234	74.10	1,061,604	805,554	653,011	51,900
Houston, East & West Texas	Mar.	191	219,354	34,219	266,486	68,412	41,924	3,033	88,481	9,123	210,970	79.20	55,516	45,676	30,191	—11,201
	3 mos.	191	599,400	105,589	743,012	177,214	153,569	10,557	269,617	27,051	636,738	85.70	106,274	76,807	28,044	—74,350
Louisiana Western	Mar.	207	229,392	78,626	331,994	71,818	71,287	10,318	102,684	19,067	278,644	83.90	53,350	35,116	28,228	52,033
	3 mos.	207	684,060	234,626	995,189	199,186	195,817	35,158	306,994	54,440	803,508	80.70	191,681	123,328	89,677	194,201
Morgan's L. & T. R.R. & S. S. Co.	Mar.	400	515,751	122,373	688,560	152,175	188,266	16,694	291,545	39,188	691,848	100.50	—3,288	—55,742	—83,905	—18,296
	3 mos.	400	1,553,106	373,864	2,077,943	384,317	541,286	55,808	885,653	111,759	1,993,382	95.90	84,561	—68,416	—192,991	—124,563
Texas & New Orleans	Mar.	544	734,138	149,100	945,849	145,730	224,613	15,180	298,950	34,205	718,666	76.00	227,183	195,117	155,735	—19,970
	3 mos.	532	2,000,818	456,088	2,613,726	426,509	648,733	43,729	900,951	92,461	2,121,254	81.20	492,472	395,704	323,019	—178,726
Spokane, Portland & Seattle	Mar.	554	452,949	100,325	617,458	58,236	97,036	8,650	196,056	19,830	387,710	62.80	229,748	155,135	123,815	145,804
	3 mos.	554	1,259,632	292,866	1,744,993	186,262	313,682	28,596	572,374	61,590	1,185,053	67.90	559,940	337,258	247,761	430,947
Tennessee Central	Mar.	296	201,607	36,024	252,950	39,159	39,238	6,823	94,796	10,524	190,400	75.30	62,550	57,463	37,917	34,959
	3 mos.	296	580,655	106,780	733,491	135,278	134,821	21,617	286,748	31,575	609,807	83.10	123,684	112,102	48,681	86,677
Term. Railroad Assoc. of St. Louis	Mar.	37	.....	.....	425,928	69,112	53,068	837	176,566	9,714	312,778	73.40	113,150	52,433	160,931	121,630
	3 mos.	37	.....	.....	1,296,192	155,609	134,836	2,645	517,561	26,688	847,249	65.40	448,943	272,537	576,963	365,717
East St. Louis Connecting	Mar.	1	.....	.....	189,124	16,701	14,639	264	70,890	3,053	105,547	55.80	83,577	78,381	56,721	55,767
	3 mos.	1	.....	.....	608,749	48,049	39,688	834	227,709	7,893	324,173	53.30	284,576	268,380	202,909	180,327
St. L. Merchant's Bridge Term.	Mar.	9	.....	.....	410,631	59,011	32,387	791	184,865	7,754	284,808	69.40	125,823	101,550	96,199	103,327
	3 mos.	9	.....	.....	1,248,637	196,577	85,699	2,497	585,849	20,811	891,433	71.40	357,204	274,174	263,916	249,561
St. Louis Transfer Ry.	Mar.	6	.....	.....	62,949	10,466	6,761	142	34,429	1,217	53,015	84.20	9,934	9,551	3,596	—1,503
	3 mos.	6	.....	.....	219,553	24,963	19,224	450	131,431	3,566	179,634	81.80	39,919	38,658	19,748	3,969
Toledo, Peoria & Western	Mar.	247	87,631	27,153	123,820	22,716	43,493	2,448	71,853	6,880	147,390	119.00	—23,570	—29,570	—36,405	16,886
	3 mos.	247	297,179	85,626	412,417	66,636	125,445	6,700	221,887	20,766	441,367	107.00	—28,950	—46,963	—71,994	—2,378
Trinity & Brazos Valley	Mar.	368	182,653	10,619	200,856	52,816	55,810	3,519	88,265	13,223	212,625	106.90	—11,769	—19,689	—40,575	—50,682
	3 mos.	368	950,069	37,084	1,017,560	146,675	156,610	11,078	406,958	37,122	756,780	74.40	260,780	236,948	117,469	—188,762
Ulster & Delaware	Mar.	128	42,470	7,796	83,344	13,969	17,889	1,818	47,179	6,096	86,951	104.30	—3,607	—9,107	—11,413	—5,024
	3 mos.	128	106,822	29,846	229,428	41,263	55,601	5,403	142,465	19,435	264,167	115.10	—34,739	—51,239	—56,049	—39,998
Union Railroad of Penna	Mar.	45	.....	.....	931,281	98,677	229,069	195	448,501	9,563	786,005	84.40	145,276	134,276	187,561	69,226
	3 mos.	45	.....	.....	2,687,019	246,036	928,015	550	1,318,532	29,739	2,522,872	93.90	164,147	131,147	240,482	323,201
Union Pacific	Mar.	3,687	5,594,655	1,224,767	7,548,869	690,524	1,719,544	141,984	2,197,149	288,935	5,181,423	68.60	2,367,446	1,698,133	1,688,560	2,070,538
	3 mos.	3,687	16,245,926	3,581,005	21,905,747	1,963,698	5,156,682	404,291	6,752,252	847,905	15,547,023	71.00	6,358,724	4,316,211	4,382,049	5,820,412
Oregon Short Line	Mar.	2,414	1,914,052	354,397	2,459,727	486,599	484,925	54,477	808,143	114,799	2,000,001	81.30	459,726	214,409	183,419	493,474
	3 mos.	2,414	5,841,003	1,066,898	7,459,324	1,024,379	1,501,734	139,047	2,496,859	328,922	5,637,933	75.60	1,821,391	1,084,738	1,008,156	1,288,651
Oregon, Wash. R. R. & Nav. Co.	Mar.	2,236	1,599,654	342,664	2,130,636	452,076	339,767	65,101	841,793	116,625	1,841,879	86.40	288,757	118,512	39,363	217,294
	3 mos.	2,236	4,546,282	1,016,438	6,116,753	1,036,137	1,066,148	184,006	2,538,377	344,409	5,250,627	85.80	866,126	355,867	139,559	906,461
Los Angeles & Salt Lake	Mar.	1,207	1,373,732	352,989	1,873,176	309,015	389,496	68,315	651,297	69,400	1,545,623	82.50	327,547	189,087	112,116	366,002
	3 mos.	1,207	4,070,544	1,008,483	5,524,611	951,932	1,148,176	192,227	1,940,935	199,120	4,602,455	83.30	922,156	507,313	312,452	688,962
St. Joseph & Grand Island	Mar.	258	241,302	18,437	275,726	46,901	51,614	2,708	105,110	11,830	218,163	79.10	57,563	40,995	26,738	21,137
	3 mos.	258	720,124	60,963	825,148	115,333	142,482	8,415	303,100	35,894	605,727	73.40	219,421	169,715	131,803	95,387
Utah	Mar.	102	125,653	343	126,667	15,205	40,792	330	27,713	6,173	90,213	71.20	36,454	27,112	22,192	—4,688
	3 mos.	102	459,880	1,493	463,810	44,925	127,934	1,100	110,501	17,781	302,241	65.20	161,569	138,956	111,081	36,749
Virginian	Mar.	545	1,233,243	63,436	1,433,570	190,856	350,003	12,395	369,261	31,984	951,055	66.30	482,515	368,192	386,252	314,835
	3 mos.	545	4,216,274	191,260	4,756,048	634,172	1,035,953	37,203	1,173,494	101,432	2,976,100	62.60	1,779,948	1,412,636	1,483,032	1,287,656
Wabash	Mar.	2,524	4,502,084	666,796	5,596,112	749,773	1,059,149	145,876	2,176,108	164,249	4,322,978	77.20	1,273,134	1,040,329	772,693	781,831
	3 mos.	2,524	12,999,344	1,964,105	16,129,067	2,022,255	3,122,710	427,870	6,500,878	478,519	12,630,173	78.30	3,498,894	2,800,494	1,965,896	1,733,556
Western Maryland	Mar.	804	1,504,320	52,659	1,625,211	229,578	359,115	36,109	507,071	44,323	1,186,424	73.00	438,787	373,787	303,565	368,395
	3 mos.	804	4,453,373	166,714	4,802,131	621,588	1,039,104	109,368	1,498,925	135,964	3,437,664	71.60	1,364,467	1,179,467	1,042,152	1,036,276
Western Pacific	Mar.	1,042	764,581	143,679	977,201	142,319	180,027	36,248	371,458	37,747	776,445	79.50	200,756	121,035	226,174	110,541
	3 mos.	1,042	2,374,448	348,259	2,908,817	434,745	597,364	107,805	1,177,920	107,748	2,468,987	84.90	439,830	202,492	547,815	308,657
Wheeling & Lake Erie	Mar.	511	1,382,683	48,358	1,521,553	162,989	379,964	31,242	513,678	41,877	1,132,222	74.40	389,331	265,220	272,656	192,176
	3 mos.	511	3,868,083	149,585	4,270,677	417,890	1,175,802	88,780	1,504,243	128,799	3,322,810	77.80	947,867	610,082	610,456	623,668

General News Department

(*Continued from page* 1353)

intendent of motive power, New York, Chicago & St. Louis; J. T. St. Clair, engineer of car construction, Atchison, Topeka & Santa Fe; T. B. Hamilton, vice-president and general manager, Pennsylvania; George Hannauer, vice-president, Indiana Harbor Belt; E. B. Hall, superintendent motive power and machinery, Chicago & North Western; and F. H. Hammill, executive vice-president, Chicago, Rock Island & Pacific.

Long Engine Runs on the Southern

The Southern Railway is now running passenger locomotives long distances on a half dozen of its main lines, as follows:

Between Washington and Atlanta, 637 miles, two engines instead of four, changes being made at Spencer, N. C., the changes formerly made at Monroe, Va., and Greenville, S. C., having been eliminated.

Between Cincinnati and Jacksonville, 840 miles, three engines are used instead of six, changes being made only at Chattanooga and Macon. Formerly engines were also changed at Somerset, Atlanta and Valdosta.

Between Cincinnati and New Orleans, 836 miles, three engines are used instead of five, changes being made only at Chattanooga and Meridian. Engines are also being run through without change between Bristol, Va., and Chattanooga, Tenn., 242 miles; Chattanooga and Memphis, 314 miles; Atlanta, Ga., and Columbus, Miss., 290 miles; Louisville, Ky., and St. Louis, Mo., 274 miles; and Rome, Ga., and Meridian, Miss., 300 miles.

K. C. S. Asks Relief from Train Control Order

The Kansas City Southern has filed a petition with the Interstate Commerce Commission asking that it be relieved from the duty of installing automatic train control as required in the two orders issued by the commission. The time for the completion of the first installation has been extended to July 1 and the petition states that a 14-mile section has been completed for test purposes, with equipment furnished by the General Railway Signal Company.

It is stated, however, that the road is primarily a freight carrying line, having only two passenger trains each way a day, and that the risk of accident is slight. Statistics are given in support of this. It is estimated that the cost to comply with the first order would be $425,000 and a list is given of other projects for capital expenditures which should have precedence. It is also stated that the company is not in the same class as to volume of business or financial condition with other roads in its territory that are included in the list of roads named in the commission's orders.

D. & H. Suit Partly Successful

In the United States Court at New York City on May 26, Judges Charles M. Hough, Learned Hand and William Bondy, in an opinion on the suit of the Delaware & Hudson, reported in the *Railway Age* of April 4, page 879, asking for an injunction against the Interstate Commerce Commission to forbid the enforcement of the commission's order calling for the installation of automatic train control apparatus between Whitehall, N. Y., and Rouse's Point, 131 miles, granted an injunction against any effort on the part of the government to enforce penalties, but refused the sweeping injunction asked for by the road.

The decision holds that the order of the commission is constitutional, and says that opinions concerning the value of automatic train control devices are so diverse that if the commission did not act, progress in many instances would be wholly arrested.

The court states the plaintiff's arguments under four heads: (a) constitutionality of the law; (b) the commission did not investigate this road's needs and therefore acted arbitrarily; (c) the roads are required to experiment with untried devices at their own cost; (d) the order of July 18, 1924, permitting the use of the forestalling feature was equivalent to a new order and therefore must allow two years for compliance. Discussing these points in order, the court's opinion may be summarized as follows:

(a) Congress did not delegate legislative authority; it prescribed a rule for the guidance of the commission, namely, "to install automatic train stops or other safety devices." The application of the rule consists in choosing the railroads and in laying down the requirements. Application is left to the commission. The court cites as authorities, St. Louis, etc., vs. Taylor, 210 U. S. 281; Union Bridge Co. vs. U. S., 204 U. S. 364; Avent vs. U. S., 266 U. S. 127.

(b) The commission did make an adequate finding of facts, though it did not mention the Delaware & Hudson by name. The court is satisfied that, in the confused state of the art, the commission's finding of facts is reasonably to be held a compliance with the law. Congress decided the matter in gross and the commission has decided the details. The commission says that what has been done during the last 15 years has demonstrated the practicability and the necessity for automatic train stops or train control. This the court holds sufficient.

(c) Congress rightfully requires the railroads to make experiments; and no experiment is possible except on the railways themselves, under actual traffic conditions. The case is parallel to the action of Congress in passing the safety appliance statutes of former years.

(d) To allow the use of a forestalling device may be equivalent to giving a road a choice of eight kinds of apparatus where previously it had a choice of only four kinds. To call such a change a mere amendment is unfair, if not absurd. The commission's opinions of 1924 frankly eat a great many of the words used in 1922.

The plaintiff, therefore, may have an injunction against prosecution for two years from July 18, 1924. In every other respect the motion for injunctive relief is denied.

Canadian Railways Minister Again Objects to Giving Details of C. N. R. Salaries

Further objection to too much prying into the business of the Canadian National by members of Parliament was registered in the House of Commons at Ottawa last week by the Minister of Railways and Canals. A few weeks ago A. J. Doucet, a Conservative member from New Brunswick, asked for a list of the officers of the C. N. R. who are in receipt of a salary of $10,000 and over per annum. At that time Mr. Graham stated, "This is a question similar to others asked and which, in the interest of the Canadian National Railway Board, it would not be in the interest of the railway to make public." This question was repeated last week and Mr. Graham had this to say: "I like to give all the information asked for, but this is a matter of business in which the people of Canada, through the Canadian National Railway Board, are endeavoring to carry on a commercial enterprise under great difficulties. The question refers absolutely to operation, and I think we have pretty well established the principle that matters affecting operation only should be very carefully handled when information is asked for. . . ."

Farmers Help Finance Great Northern Extension

A revival of railway construction in the northwest through a return to the formerly common practice of prospective patrons assuming part of the burden of financing new railway lines, is indicated in news from southeastern Montana. At Opheim, Mont., recently, 500 farmers from the surrounding territory, as well as from across the border in Canada, met with officers of the Great Northern to arrange for the financing of the 50-mile extension from Scobey, Mont., to Opheim. At that meeting approximately $250,000 of Great Northern stock was subscribed for at par, the individual subscriptions ranging in amount from $200 to $5,000. The subscription lists are still open and it is expected that more than 1,000 farmer patrons in northeastern Montana will be owners of Great Northern stock when the tally is completed.

The Great Northern extension is the first project of magnitude in recent years for the opening up of new farming country in the northwest. The new line will furnish transportation facilities for a rich agricultural region of over 250 square miles. The farmers now in the territory have had to haul their crops from 40 to 55 miles to the nearest railroad shipping point. Approximately 1,300,000 bushels of grain were marketed by the farmers in the Opheim and Glentana district from last season's crops, the cost of hauling this to the railway being from 35 to 40 cents per bushel. The farmers who have helped to secure the new line by purchasing Great Northern stock expect to save an average of 25 cents per bushel on the cost of transportation when the new line is ready.

National Industrial Conference Board Elects New Members

The National Industrial Conference Board (247 Park avenue, New York city) announces the election of 13 new members for terms of two years, representing various important interests. They are: A. C. Bedford, chairman Standard Oil Company of New Jersey; Charles F. Brooker, chairman American Brass Company; W. L. Clause, chairman Pittsburgh Plate Glass Company; Philip T. Dodge, chairman International Paper Company; Irenee du Pont, president E. L. du Pont de Nemours & Co.; Eugene G. Grace, president Bethlehem Steel Corporation; Hon. Alanson B. Houghton (ambassador to Great Britain), chairman Corning Glass Works; Leonor F. Loree, president Delaware & Hudson Company; William H. Nichols, chairman Allied Chemical & Dye Corporation; Guy E. Tripp, chairman Westinghouse Electric & Manufacturing Company; H. Herman Westinghouse, chairman Westinghouse Air Brake Company; Owen D. Young, chairman General Electric Company; George M. Verity, president American Rolling Mills Company.

The chairman of the board is Frederick P. Fish and the president Magnus W. Alexander.

Medical and Surgical Section at Atlantic City

The medical and surgical section of the American Railway Association held its annual meeting at Atlantic City, N. J., on May 26. At the dinner in the evening, R. H. Aishton, president of the association, made an address outlining the railroad problem in medical language. He said, in part:

"Never in the history of the railroads in this or any other country has transportation been so efficient as it is or has been in the United States during the past two years; and yet, notwithstanding enormous expenditure of capital to provide efficient and better operation and reductions in rates giving shippers $600,000,000 in one year, the net earnings of the railroads as a whole have not yet come up to the amount designated as a fair return by the Interstate Commerce Commission.

"The doctors have prescribed as the minimum diet on which the patient can thrive and continue to function, a certain percentage on their property, but this has not yet been realized. Many people think they are competent doctors and are disposed to fix the prescription regardless of what the diagnosis may disclose. I urge you gentlemen, in coming in contact with these people, to suggest that a diagnosis, with a proper prescription, is more to be desired than post mortems, and to suggest the necessity for the application of the same methods in these matters of such vast public interest, that you in your profession find so necessary and successful. One great trouble with the railroad problem has been the tendency toward prescribing and reaching conclusions as to remedies, for every situation that arises, through legislative and other methods, without first making a complete diagnosis.

"Even before the war the railroad patient was generally considered to be in a pretty bad way. Throughout the World War he was worked beyond his capacity. Some of the doctors who were prescribing at that time did not have time for diagnosis; they simply had to push the patient to the limit of his endurance, with the result that after the war the railroads were suffering from shell shock, had a superabundance of gas, their circulation was poor, their arteries showed symptoms of sclerosis, they had a good deal of congestion, their elimination was insufficient, their nervous system was jumpy and they seemed to be in a great mental depression. In fact, the situation was so bad that for probably the first time a very complete diagnosis was made and the result was a prescription by Congress, which is embodied in the Transportation Act. One of the large results of that Act was the substitution of a clinic of doctors, specialists in their various lines, the Interstate Commerce Commission, in the place of—but still retaining by agreement the counsel of, the 48 different doctors that, independent of each other and without co-ordination with the federal commission, formerly prescribed for the railroads.

"Another important element in the prescription was the duty laid on the doctors, provided there was honest, efficient and economical management, to furnish proper subsistence for the continued health and efficiency of the patient by providing a basis for a very modest return on the investment in the railroads, to be fixed by the doctors on what is known as the tentative valuation of the railroads. This was one of the most constructive things ever done for the transportation companies of this country."

Traffic News

The next meeting of the Southeast Shippers' Regional Advisory Board will be held in the Ansley hotel, Atlanta, Ga., on June 2.

The Great Lakes Regional Advisory Board will hold its annual meeting at the Chamber of Commerce, Toledo, Ohio, on June 9. The meeting will be followed by a joint banquet in the evening by the Great Lakes Regional Advisory Board, the Toledo Chamber of Commerce and the Toledo Transportation Club. L. G. Macomber, traffic commissioner of the Toledo Chamber of Commerce, is president of the Great Lakes Regional Advisory Board.

The Illinois Central has revised its freight schedules between Chicago and New Orleans, La., by cutting the time 24 hours. The new schedule will give third morning delivery in New Orleans instead of fourth. In conjunction with the new schedule two classes of freight, manifest and time, have been consolidated into one class to be known as dispatch freight. Originally, manifest freight has been given fourth morning delivery and time freight fifth morning delivery.

The Chicago, Rock Island & Pacific on May 31 will inaugurate a passenger train to be known as the Mid-Continent Special which will operate between the Twin Cities and Dallas, Texas. The train will leave Minneapolis, Minn., at 10:20 p. m., arriving in Dallas at 10:15 a. m. the second morning. Returning, the train will leave Dallas at 8 p. m. and will arrive in Minneapolis at 8:10 a. m. the second day. The train will be routed by way of Des Moines, Iowa, Kansas City, Mo., Topeka, Kan., Wichita, Kan., Oklahoma City, Okla., and Ft. Worth, Texas.

In establishing a new boat train, the Parisian, from Chicago to New York, the Pennsylvania, in conjunction with the French Line, plans to cut the traveling time between Chicago and Paris to approximately seven days, eliminating delay in New York for steamship connection. The first run of the Parisian will be made from Chicago on June 18, connecting with the steamship France at New York the following day. The Parisian will also be operated from Chicago on June 25 and July 4, to connect with sailings on the following days of the steamships Paris and the De Grasse and at later dates. Boat train service will be available to first, second, and third class passengers.

The second annual meeting of the Great Lakes Regional Advisory Board will be held in Toledo, Ohio, on June 9. In the evening a joint banquet will be given by the Great Lakes Regional Advisory Board, the Toledo Chamber of Commerce, and the Toledo Transportation Club. The docket of the meeting includes a report of the Car Service division of the American Railway Association on general conditions throughout the country, that of the district manager on conditions in the territory of the board, that of railroads, of standing committees, of special committees, and of the Central Freight Association. The Mechanical division of the American Railway Association will report on loading furniture and flour in steel box cars with reference to damage due to sweating.

Farm Bureau Federation Asks Investigation of Freight Rates

The American Farm Bureau Federation and the Nebraska Farm Bureau Federation have joined in a statement filed with the Interstate Commerce Commission in connection with its freight rate investigation under the Hoch-Smith resolution, urging the necessity of a very careful nation-wide review and investigation of the freight rate situation as it applies to agricultural commodities, and the importance of considering "the present demand of agriculture that its commodities and products be carried to its best markets through the most economic routes so that the farmer may receive the largest share of the consumer's price for such commodities with the least expense in transportation." They also ask that there may be considered "the necessity of encouraging and aiding the largest industry in our land." The statement said that "in general it is recognized that rates on many commodities, more particularly products of agriculture, bear a disproportionate relation to the prices of the several commodities."

Commission and Court News

Interstate Commerce Commission

The Interstate Commerce Commission has issued a decision awarding the Erie an increased division of the joint eastbound transcontinental rates on fresh fruits and vegetables in carloads to its Duane street terminal in New York. The order provides that after the Erie has received 3 cents per hundred pounds for terminal service the remainder of the revenue shall be divided 27.5 per cent to the lines east of Chicago and 72.5 per cent for the lines west of Chicago.

The commission has rendered a decision finding unreasonable and unduly prejudicial rates on coal from mines on the Virginian in the New River district of West Virginia to interstate destinations, to the extent that they exceed the district rates maintained from mines in the New River districts of the Chesapeake & Ohio and Virginian and the Pocahontas and Tug River districts of the Norfolk & Western, these districts forming part of what is generally referred to as the Outer Crescent. Commissioner Cox dissented, saying that it is not in the public interest to require the Virginian to extend the highly competitive New River basis to mines served exclusively by the Virginian.

Missouri & North Arkansas Divisions Reaffirmed

The Interstate Commerce Commission, after a rehearing of the Missouri & North Arkansas divisions case, has rendered a decision finding, upon consideration of the entire record, that the divisions of interstate joint freight rates on traffic originating or terminating at stations on the line of the Missouri & North Arkansas, and interchanged prior to March 1, 1922, between the Missouri & North Arkansas and its immediate connections, were unjust, unreasonable, and inequitable. It finds further that the divisions prescribed in the original report are, and for the future will be, just, reasonable, and equitable divisions of the interstate joint freight rates applying to traffic interchanged between the Missouri & North Arkansas and the eight other respondent carriers, excluding that traffic as to which the Missouri & North Arkansas serves solely as an intermediate carrier. If it shall hereafter appear that in special instances the divisions prescribed and now approved operate unjustly, inequitably, or otherwise unreasonably to the injury of any carrier participating in a joint rate with the Missouri & North Arkansas, such situations may be called to the commission's attention by appropriate proceedings to the end that it may afford such relief as it may find warranted. No order will be entered at this time.

The commission held that, all carriers whose lines connect directly with that of the Missouri & North Arkansas having been joined as respondents, the other carriers which unite in publishing the rates and participate in transporting certain of the through traffic interchanged, are not necessary parties in a proceeding to determine the divisions of joint rates between the Missouri & North Arkansas and each of its immediate connections.

Commissioner Hall dissented, saying: "From this labored report I can draw no assurance that any one of the eight immediate connections, to say nothing of other participants in the joint rates, will receive out of those joint rates its just, and fair, and equitable share as compensation for its share of the transportation service rendered under those rates, and without some reasonable assurance that we are discharging this duty I can not take part in the conclusions of the majority."

State Commissions

The Oklahoma Corporation Commission has refused to approve an application for permission to operate a passenger motor bus line between Oklahoma City, Okla., and Cushing on the grounds that the service given by the Missouri-Kansas-Texas and the Atchison, Topeka & Santa Fe between these points is sufficient to meet the demands of the public.

Foreign Railway News

Automatic Brakes in Sweden

In a footnote on page 431 of the *Railway Age* of February 14, it was erroneously stated that Germany was the only European country in which automatic brakes are used extensively in freight service. K. A. Svensson, a director of the Swedish State Railways, writes that 90 per cent of the freight cars in operation on this system are now equipped with Kunze-Knorr air brakes, and that the remainder will be so equipped before the end of the year.

Electrification and Extensions Planned by South Indian

An estimate of about 33,000,000 rupees for the electrification and double-tracking of the lines of the South Indian Railway, in the suburbs of Madras, has been sent to the home board by the authorities of the railway at Trichinopoly; upon a reply, expected shortly, the estimate will be forwarded to the railway board at Delhi for the necessary sanction, according to Commerce Reports.

The program calls for the laying of 1,100 miles of new railway within the next five years, or about 200 miles a year. A part of this scheme has already been approved by the railway board.

Electrification Progress Reported in Soviet Russia

A beginning has been made on the electrification of the railways of the Soviet Union, according to bulletins received from Moscow by the Russian Information Bureau in Washington. Several of the Moscow suburban lines are being electrified, and also the Suram mountain pass section of the Transcaucasian line, between Tiflis and Batum. In all 94 miles are being brought to completion. An additional 105 miles will shortly be begun, including the electrification of the Leningrad suburban lines. The general electrification program, it is said, calls first for the electrification of suburban and mountain lines and eventually for the establishment of electric trunk lines adapted to the transport of trains up to 7,000 tons.

New Bolivian Line to Be Opened in July

In July the new Bolivian railway from Atocha to Villazon, on the Argentine frontier, will be opened, according to the Times (London) Trade Supplement. This railway will make it possible to travel all the way by rail from Buenos Aires to La Paz, a distance of about 1,500 miles. La Paz is already connected with the Pacific by three railway lines, so the new road provides a second trans-continental road for South America.

Another line is being extended from La Paz to Puerto Baris on the Beni river, which is a navigable tributary of the Amazon.

The Bolivian government has commenced negotiations in London for the construction of an extension of a branch line which now reaches to Cochabamba, eastward to Santa Cruz, and thence to the river Paraguay, on the eastern frontier of the country, where connection will be made with the railways of Brazil.

A new line is being built to Sucre, whence another line will be extended southward to a junction with the new trans-continental line at Villazon Yet another connection with the railways of Argentina will be made by the construction of a line to Yacuiba on the Argentine frontier.

Koenigsberg International Railway Conference

The tariff union for the "German-Lithuanian-Russian Railroad Traffic" formed by an agreement in 1923, held its first meeting in Koenigsberg recently attended by government representatives and railroad experts from Germany, Lithuania, Latvia, Esthonia and Russia, according to Consul Harold Clum at Koenigsberg.

The union has as its object the "promotion of inter-communication between East Prussia and Lithuania on the one side and Russia on the other side, in connection with Latvian and Esthonian interests"—in particular, to re-establish through tariffs

for passengers, baggage, express freight, and ordinary freight, to run direct through trains for passengers, and to settle certain technical questions important for the regulation of a rapid and smoothly running traffic.

The resolutions passed by the conference, which must be ratified by the respective governments in order to become effective, provide for the naming of several stations in Germany, Lithuania and Russia where second and third class tickets may be issued, via Latvia. Through tariffs for passenger, baggage, and express traffic were arranged, as well as some plans for expediting through freight traffic. If the proposals of the conference are realized, the forwarding of express freight will be so expedited as to cover the Koenigsberg-Moscow haul in three days.

On account of the numerous difficulties inherent in the situation, only a beginning could be made toward their solution; but other meetings are planned for the future. The management of the union was placed in the hands of the German railway direction of Koenigsberg.

Report of National Railways of Mexico

The report of National Railways of Mexico for the year ended June 30, 1924, shows receipts of 1,589,556 Mexican gold pesos, comparing with 1,674,307 in preceding year, according to the Wall Street Journal. Expenses, taxes, interest charges, etc., were 24,920,659 against 24,939,867, leaving deficit for year of 23,331,103 Mexican gold pesos as contrasted with 23,265,560 in previous year. Profit and loss deficit on June 30, 1924, was 262,880,164 Mexican gold pesos against 239,520,461 at close of previous fiscal year.

The general balance sheet of National Railways of Mexico as of June 30, 1924, compares as follows (figures in Mexican gold pesos):

	1924	1923
Assets		
Road and equipment	853,105,124	853,102,124
Add. and betterments	26,366,352	26,366,352
New construction	26,215,358	25,697,482
Investments	17,539,573	17,539,573
Cash	603,328	561,347
Accr. interest on sec.	5,669,267	5,031,280
Insurance premiums	76,429	77,954
Accounts rec.	11,039,112	9,869,414
Material and supplies	11,207,354	11,207,354
Profit and loss def.	262,880,164	239,520,461
*Total	1,214,702	1,188,973
Liabilities		
Capital stock	448,351,377	448,312,377
Fund debt	407,672,380	407,672,380
Other bonds	5,104,895	5,140,895
Interest on bonds and stocks	226,397,495	204,557,777
Uncl. dividends	19,496	20,286
Accounts pay.	20,270,202	18,672,842
Res. for mat. adj.	2,911,617	2,911,616
Res. for rep. and renew.	12,920,981	12,920,982
Sinking fund	18,315,471	16,026,037
Notes payable	67,324,263	67,324,263
Equipment depr. fund	4,920,400	4,920,400
Res. fund	493,486	493,486
*Total	1,214,702	1,188,973

*Last three figures omitted.

The report of Alberto J. Pani, chairman, to the shareholders says, in part:

"The company's matured obligations, up to June 30, 1924, amount to $156,810,614 (U. S. Cy.). On December 8, 1923, as is undoubtedly known by the shareholders, the International Committee of Bankers on Mexico declared the agreement of June 16, 1922, between said committee and the Mexican government, by which the latter assumed the company's debt, as operative. The efforts put forth by the above mentioned government to faithfully comply with the agreement were notorious, and you may, therefore, have heard of same. Much to its regret, certainly, it found itself in the case of considering the agreement in suspense, pressed by the manifold difficult circumstances which the country experienced after the military uprising initiated during the first days of the aforesaid month of December.

"It is to be hoped that, once peace has been restored and thereby the tendency of all affairs and the public administration towards normal conditions, the government shall, upon the reestablishment of its financial equilibrium, resume the payments that should be made according to said agreement.

"During the year 1923, the Wells Fargo & Co.'s Express (Mexican corporation), started negotiations with the government to obtain payment on account of what it considers should be received as compensation for having been deprived from express operation on the National Railways System, and succeeded in securing from the then Secretary of Finance, Don Adolfo de la Huerta, authorization for payment of a sum up to 1,000,000 (Mex. Cy.) in monthly installments.

"Later, the present Secretary of Finance considered it necessary to modify the said authorization to conform with the established policy of the federal government of not directly assuming this company's obligations but only responsibility therefor, thus assisting the latter efficiently without detriment to its administrative independence. For this reason and deeming it convenient to carry out the arrangement outlined with the above mentioned corporation, the board of directors, on January last, resolved to effect a payment of 1,000,000 (Mex. Cy.) in monthly installments of 25,000 (Mex. Cy.), on the understanding that a liquidation would be arrived at with the said company of the amount of compensation it might be entitled to. To this effect certificates were issued, bearing the guarantee of the government to honor same in case they are not paid at maturity.

"The government has accepted, in connection with this arrangement, up to June 30 this year, certificates to the value of 150,000 (Mex. Cy.).

"During the year covered by this report the sum of £3,000 has been furnished to the Interoceanic Railway of Mexico (Acapulco to Vera Cruz) Ltd., and £600 to the Michoacan & Pacific Railway Co., Ltd."

Miscellaneous Items

The following reports have been received by the Transportation Division of the Bureau of Foreign & Domestic Commerce from its agents in various parts of the world:

Contracts for 16 electric locomotives for the Czechoslovak Railways, at a price of 45,000,000 Czech crowns (approximately $1,350,000), have been let to six domestic firms. This represents the first actual step toward the electrification of the railways surrounding Prague. Details as to the division of the contracts may be obtained from the Transportation Division of the Bureau of Foreign & Domestic Commerce.

Rumanian railway rates were increased by 30 per cent on May 1, according to a cablegram from Commercial Attache Van Norman at Bucharest, instead of 50 per cent as had been contemplated.

Motor competition has caused a decrease in traffic on the Irish railways serving seaside resorts. Both passenger and freight traffic have experienced a heavy falling-off.

The Spanish Superior Railway Council has authorized the construction of a line from Alcazar to Guadalajara which will connect the Madrid-Barcelona line with that of Andaluces. Officers of the Santander-Mediterraneo Railway have been in Santander recently inspecting the line of the Astillero-Ontaneda Railway, which will probably be purchased and incorporated in the former line.

The South Indian Railway wants 110 freight cars for metergage track. Specifications and forms of tender are available at the company's offices, 91 Petty France, Westminster, S. W. 1, London. Tenders addressed to the chairman and directors of the South Indian Railway, Ltd., marked "Tender for Wagons," must be in the hands of the managing director not later than noon on June 19, 1925.

The Manchurian government plans the construction of 150 miles of railway northeast from Mukden toward Kirin. Estimated requirements for this line include 18,000 tons of steel rails and accessories, 16 locomotives, and approximately 110 freight cars of different types. A department has been created in Mukden to handle the affairs of this enterprise, and tentative inquiries have been made regarding the cost of materials.

The Krupp Works have been awarded a contract for 3,000 wheels for the Argentine State Railways, as they met all conditions of the tender and were lowest in price.

German firms have secured contracts for five locomotives for Egypt, taking the business easily from Belgian, Austrian, Italian, Swiss and English bidders. An order for five locomotives for Argentina was also taken by the Germans from a wide field, as was also an order for fifteen locomotives for Greece. Orders for cars have recently been taken by German firms for India and South Africa.

Polish industry wants a reduction of railway export rates, but the government insists that industry must stand on its own feet, and says that railway rates cannot be lowered to the point of causing a railway deficit.

Equipment and Supplies

Locomotives

THE ATLANTA, BIRMINGHAM & ATLANTIC is inquiring for 3 locomotive tenders.

SEQUEIRA & CIA., LTD., Brazil, have ordered 4 Mikado type locomotives from the Baldwin Locomotive Works.

THE CURITYBA CIA., DE MADEIRA, Brazil, has ordered one Mikado type locomotive from the Baldwin Locomotive Works.

THE NEW YORK, CHICAGO & ST. LOUIS has ordered 10 eight-wheel switching locomotives from the Lima Locomotive Works. This is in addition to the 10 eight-wheel switching locomotives ordered from the same builder and reported in the *Railway Age* of May 2.

Freight Cars

MICHIGAN CENTRAL.—See New York Central.

THE CHICAGO, INDIANAPOLIS & LOUISVILLE is inquiring for 5 caboose cars.

THE GREAT NORTHERN will repair 600 box cars of 50 tons' capacity in its own shops.

THE ANDES COPPER MINING COMPANY is inquiring for 60 Ingoldsby type hopper cars of 40 tons' capacity.

THE GENERAL EQUIPMENT COMPANY has ordered 10 flat car bodies from the American Car & Foundry Company.

THE UNITED ELECTRIC COAL COMPANY has ordered 30 all steel rotary dump cars from the American Car & Foundry Company.

THE SOUTH PORTO RICO SUGAR COMPANY has ordered 30 cane cars of 30 tons' capacity, from the Magor Car Corporation.

THE NEW YORK CENTRAL has ordered from the Roger Ballast Car Company, 50 ballast cars of 50 tons' capacity, for the Michigan Central.

THE QUAKER CITY TANK LINE has ordered 100 tank cars of 8,000 gal. and 50 tons' capacity, from the Standard Tank Car Company.

THE GREEN BAY & WESTERN has ordered 150 box cars from the Pressed Steel Car Company, and 50 automobile cars from the General American Car Co.; all the cars are of 40 tons' capacity.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 500 mill type gondola cars from the Standard Tank Car Company and 500 flat cars from the Ryan Car Company. The inquiry was reported in the May 9 *Railway Age*.

Passenger Cars

O. E. SZEKELY, Moline, Ill., is inquiring for one dynamometer car.

THE ARARAQUARA RAILWAY, Brazil, is inquiring for 4 passenger cars.

THE TENNESSEE, ALABAMA & GEORGIA has ordered one gas-electric car from the J. G. Brill Company.

THE HAVANA CENTRAL is inquiring for 7 first-class passenger coaches 71 ft. 4 in. long for the United Railways of Havana.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 2 buffet-baggage cars from the Pullman Car & Manufacturing Corporation.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered from the Bethlehem Shipbuilding Corporation, Ltd., 4 express cars and one postal car.

THE LAKE ERIE, FRANKLIN & CLARION has ordered one combination passenger and baggage gasoline rail motor car from the J. G. Brill Company.

Iron and Steel

THE NORTHERN PACIFIC is inquiring for 1,200 tons of structural steel for ore docks at Superior, Wis.

THE MISSOURI PACIFIC has ordered 300 tons of structural steel from the American Bridge Company.

THE ATLANTIC COAST LINE has ordered 15,000 tons of rail from the Tennessee Coal, Iron & Railroad Company.

THE ILLINOIS CENTRAL has ordered 380 tons of structural steel for use at Riverdale, Ill., from the Mississippi Valley Structural Steel Company.

Machinery and Tools

THE SOUTHERN PACIFIC is inquiring for one 10-ton, one 25-ton and two 3-ton overhead traveling cranes.

THE DELAWARE & HUDSON has placed orders for a 500-ton double end wheel press, and a combination journal turning axle lathe.

THE PULLMAN CAR & MANUFACTURING CORPORATION is inquiring for one 14-in. engine lathe, one 3-ft. radial drill, two buffing machines, one forging machine, and one planer.

THE NEW YORK CENTRAL has divided an order for six locomotive cranes between the Industrial Works and the Brown Hoisting Machine Company. An order for an additional crane will be placed later.

THE DELAWARE, LACKAWANNA & WESTERN has placed orders for two 11-in. by 5-ft. rapid production lathes; a 60-in. horizontal boring and drilling machine; a 7-ft. vertical boring and turning mill and a 6-ft. radial drill.

THE CHESAPEAKE & OHIO is inquiring for 14 five-ton jib cranes, 28 two-ton jib cranes, 1 fifteen-ton electric crane, 1 ten-ton hand power crane with a 35-ft. span, two jib cranes, one with electric hoist and the other with hand power hoist, and 30 hand power hoists for its shops at Russell, Ky.

Signaling

THE NEW YORK CENTRAL has ordered from the General Railway Signal Company an interlocking machine, style A, 32 levers, for installation at Stuyvesant, N. Y.

THE SOUTHERN PACIFIC has ordered from the General Railway Signal Company an electric interlocking for installation at Dallas, Tex.; 37 working levers and 11 spaces. The order includes 13 semaphores and 8 dwarf signals.

THE LOUISVILLE & NASHVILLE has ordered from the General Railway Signal Company an electro-mechanical interlocking, 4 and 2 levers, for the drawbridge at Chef Menteur, La.; also material for a similar installation at Rigolets, La.

THE CANADIAN PACIFIC has ordered from the Union Switch & Signal Company signals and other material for automatic block signaling on its line between Virden, Man., and Kirkella, 27 miles, single track; also for the line between Beavermouth, B. C., and Connaught, 17 miles, single track.

A BOILER WASHER injured by a fall while mounting the running board of an engine when he took hold of the hinged top of a signal marker on the front end of the engine, which opened when he did so, sued for damages. There was evidence that the marker was so located as to interfere with plaintiff in his attempt to grasp the handrail. The jury found that this obstruction of the handrail was a violation of the federal Safety Appliance Act. The Indiana Appellate Court held that the evidence was sufficient to sustain a general verdict of negligence in the location of the signal markers and that plaintiff did not assume the risk of such danger.—B. & O. v. Metzler (Ind. App.) 143 N. E. 707.

Supply Trade News

The **Engineering Products Company,** Rialto building, San Francisco, Cal., has been appointed Pacific Coast representative of the **Clark Car Company,** Pittsburgh, Pa.

George T. Willard, representative of the Rail Joint Company, has resigned to become a sales representative of the **Railroad Supply Company.** His headquarters will be in Chicago.

Harold B. Chamberlain is now associated with the **Tuco Products Corporation,** New York, as assistant to the president. In 1909, Mr. Chamberlain served on the Baltimore & Ohio, in the motive power department, at Baltimore, Md. The following year, he entered the service of the Safety Car Heating & Lighting Company, in its electrical laboratory at Jersey City, N. J., and on the formation of the Transportation Utilities Company, which later became the Tuco Products Corporation, he was identified with the manufacturing department, at Chicago, later entering the sales department in New York, and serving as sales manager from 1916 to 1918. He was then appointed sales manager of the marine department of the Ellcon Company, with headquarters in New York, which position he held until his recent appointment, as above noted.

H. B. Chamberlain

J. I. Vincent, for several years representative of the Strauss-Bascule Bridge Company, is now connected with the railroad sales department of the **Lewis Asphalt Engineering Corporation,** New York, successors to Gardiner & Lewis, Incorporated.

The Impact Register Company, Inc., Champaign, Ill., of which **W. S. Redhed** is president and treasurer, **H. B. Morrow,** vice-president, and **L. A. Busch,** secretary, has acquired from the Savage Impact Register Company the exclusive rights to manufacture and sell the Savage impact register for the measurement of impact in cars and elsewhere, and Edwin W. Savage has retired from active connection with the sale of this device.

The G. A. Gray Company, Cincinnati, Ohio, has given the general contract to the **Austin Company,** Cleveland, covering the design, erection and equipment of its new plant at Cincinnati. The work was reported in the *Railway Age* of April 18.

Scott Donahue, 2615 Grand Central Terminal, New York, has been appointed representative of the **Pollak Steel Company,** Cincinnati, Ohio, in charge of the New York territory. Mr. Donahue also represents the **Edgewater Steel Company,** of Pittsburgh, Pa.

Louis E. Livingston, heretofore working out of the Chicago office of the **Barco Manufacturing Company,** in future will be located in the southwest territory, with headquarters at Fort Worth, Texas. He will report to **W. J. Behlke,** district sales manager in that territory.

G. H. Webb has been appointed Philadelphia sales manager of the **Central Steel Company,** Massillon, Ohio. He succeeds A. B. Cooper who died at his home in Philadelphia on May 3. Mr. Webb has been identified with the Central Steel Company for more than eleven years.

The Stearns Conveyor Company, Cleveland, Ohio, has opened a branch office at 3233 Roberts street, Kansas City, Mo., in charge of **R. J. Hanna.** This company has moved its New York district office to 935 Singer building. The company has acquired the general distribution for the United States of the Messiter conveyor scales.

The Continental Bolt & Iron Company's plant at Chicago has been purchased by the **Gary Screw & Bolt Company,** a subsidiary of the **Pittsburgh Screw & Bolt Company,** Pittsburgh, Pa. The Continental plant will be operated by the present officers of the Gary Screw & Bolt Company and the Pittsburgh Screw & Bolt Company.

The Thompson Electric Welding Company, Lynn, Mass., has removed its Chicago office from 817 West Washington Boulevard, to 549 West Washington street; this office is in charge of **F. H. Leslie.** The company has discontinued its connection with the English & Miller Machinery Company, Detroit, Mich., and is now represented in Michigan by **James A. Muir,** General Motors building, Detroit, Mich. On June 1, the Thompson Electric Welding Company will discontinue the sales office in Cincinnati, Ohio, and will open a new office in the Leader building, Cleveland; **C. E. Seifert** and **M. G. Littlefield** will be located at this office. **R. S. Donald,** 50 Church street, New York City, represents the company in New York.

FREIGHT CARS ORDERED, INSTALLED AND RETIRED

Month 1924	Domestic orders reported during month	Installed during month	Aggregate capacity tons	Retired during month	Aggregate capacity tons	Owned at end of month	Aggregate capacity tons	An order as of first of following month	Building in R. R. shops
January	6,020	15,589	707,367	12,329	516,695	2,310,032	100,644,107	21,696	2,417
February	18,365	11,386	554,481	10,466	411,226	2,310,570	100,767,731	40,030	2,715
March	35,846	9,962	446,094	8,726	352,481	2,311,405	101,165,332	62,340	2,697
April	11,189	8,718	369,978	8,026	306,288	2,312,074	101,223,891	62,289	2,739
May	435	9,199	439,516	9,059	360,212	2,312,237	101,303,200	57,266	2,467
June	387	10,909	538,118	8,347	321,094	2,314,798	101,569,593	57,735	2,269
July	533	16,583	1,151,302	8,413	316,927	2,322,968	102,388,652	51,156	4,602
August	4,751	15,452	785,288	8,834	333,173	2,329,582	102,845,000	40,961	3,618
September	22,520	15,455	779,078	9,337	370,607	2,336,147	103,270,000	47,553	3,045
October	11,853	16,598	834,762	10,504	*418,816	2,342,149	103,688,000	[1]38,403	[2]3,574
November	13,038	11,705	579,234	10,678	463,970	2,342,479	103,767,000	42,765	5,159
December	9,526	6,763	311,254	11,918	488,035	2,337,229	103,585,000	54,202	6,478
January, 1925	10,312	11,768	551,263	7,867	326,812	2,341,109	103,812,974	58,910	5,285
February	5,388	15,024	721,867	9,453	365,111	2,346,687	104,169,525	50,603	4,878
March	4,677	16,007	753,947	12,067	474,644	2,350,697	104,454,128	45,419	5,572
April	5,525	.....	.....	.....	.....	.....	.....	.....	.....
Total for 3 months	.....	42,799	.....	.....	.....	.....	.....	.....	.....
Total for 4 months	25,962	.....	.....	.....	.....	.....	.....	.....	.....

*Corrected figure.

[1]Details as to orders from *Railway Age* weekly reports. Figures include all domestic orders placed with builders and railroad shops but not rebuilt equipment.

[2]Figures as to installations and retirements prepared by Car Service Division A. R. A. Figures cover only those roads reporting to the Car Service Division. They include equipment received from builders and railroad shops. Figures of installations and retirements alike include also equipment rebuilt to an extent sufficiently so that under the accounting rules it must be retired and entered in the equipment statement as new equipment. The figures as to orders as given in the first column of table are not comparable with figures relating to installations given in succeeding columns.

The International Railway Supply Men's Association, during the exhibition held in connection with the International Railway Fuel Association Convention at Hotel Sherman, Chicago, May 26 to 29, elected the following officers: president, **Bard Brown,** Superheater Company, New York; vice-president, **F. S. Wilcoxen,** Edna Brass Manufacturing Company, Chicago; treasurer, **W. H. Harris** of the W. H. Harris Coal Company, Chicago; secretary, **F. P. Roesch,** Standard Stoker Company, Chicago. Members elected to the executive committee were **M. K. Tate,** Lima Locomotive Works, Lima, Ohio, **L. G. Plant,** National Boiler Washing Company, Chicago, **W. H. Heckman,** Harry Vissering & Co., Chicago and **C. O. Jenista,** Barco Manufacturing Co., Chicago.

William H. Reaves has been appointed southwestern sales agent, with headquarters at 1169 Arcade building, St. Louis, Mo., in charge of sales of lock washers, nut locks and spring washers for the **National Lock Washer Company,** Newark, N. J. Mr. Reaves was formerly with the Rock Island Lines at Chicago and later with the same railroad at Little Rock, Ark. He was subsequently appointed southwestern sales agent for the P. & M. Company, with headquarters at St. Louis. In January, 1924, he became secretary and treasurer of the Railway Equipment Company, St. Louis, and on April 1, 1925, left that company to organize the William H. Reaves Supply Company. Mr. Reaves will also handle the accounts of the P. & M. Company and the Maintenance Equipment Company, in St. Louis and the southwest.

Westinghouse Electric & Manufacturing Company

The annual report of the Westinghouse Electric & Manufacturing Company shows for the fiscal year ended March 31, 1925, gross earnings of $157,880,292 as compared with $154,412,918 in the preceding year. Net income available for dividends totaled $15,324,364 as compared with $16,125,303 in the year ended March 31, 1924. Comparison of gross and net earnings for the past three years follows:

Year Ended March 31	1925	1924	1923
Gross earnings—sales billed	$157,880,292	$154,412,918	$125,166,115
Cost of sales	144,242,065	137,006,280	111,694,832
Net manufacturing profit	$13,638,227	$17,406,638	$13,471,283
Other income	4,203,179	1,336,438	1,296,601
Gross income from all sources	$17,841,406	$18,743,076	$14,767,884
Interest charges, etc.	2,517,042	2,617,773	2,504,398
Net income available for dividends and other purposes	$15,324,364	$16,125,303	$12,263,486

The decrease in the total value of all orders booked was 5 per cent as compared with the previous year. The orders for incandescent lamps and radio apparatus substantially exceeded last year. The value of unfilled orders at the close of the fiscal year was $55,271,908, compared with $63,738,702 at the close of the previous fiscal year.

Correction

The item appearing in the *Railway Age* of May 9 to the effect that J. W. Cain, manager of purchases of the Consolidated Purchasing Agency of the American Short Line Railroad Association, had been appointed representative of A. O. Norton, Inc., in the newly opened office in Houston, Texas, was incorrect in that the firm of **J. W. Cain & Company,** Houston, Texas, has been organized and has been appointed southwestern representative of **A. O. Norton, Inc.** J. W. Cain will continue as manager of purchases of the Consolidated Purchasing Agency of the American Short Line Railroad Association. He will maintain offices in Chicago and Houston, Texas.

Obituary

Alexander C. Armstrong, for the past fifteen years in the engineering department of the American Bridge Company, at New York, died on May 21 in the Long Island College Hospital, Brooklyn, N. Y., at the age of 50.

Railway Construction

BEAVER, MEADE & ENGLEWOOD.—The Interstate Commerce Commission has made public a tentative report by Attorney-Examiner Boles and Engineer-Examiner Gray recommending a finding by the commission that the public convenience and necessity have not been shown to require the construction of a proposed extension from Hooker, Okla., to Des Moines, N. M., 175 miles. The commission has allowed an extension of time from June 30, 1925, to December 31, 1926, in which the company may complete an extension from Forgan to Hooker, Okla., 39.2 miles, which was authorized by an order of the commission on January 29, 1924.

CHICAGO, BURLINGTON & QUINCY.—A contract has been awarded to Harvey Wood, Aurora, Neb., for the construction of a nine-stall addition to the roundhouse at Lincoln, Neb., plans for which were reported in the *Railway Age* of April 4.

DETROIT, TOLEDO & IRONTON.—Plans are reported to have been prepared for the construction of a classification yard at West Toledo, Ohio, which will contain approximately 15 miles of track.

GOLDEN BELT.—The Interstate Commerce Commission has denied the petition of this company for permission to build a line from Great Bend, Kans., northward to Hays, with a short branch—a total distance of 108 miles.

GRAND TRUNK WESTERN.—This company, jointly with the Indiana Harbor Belt and Chicago River & Indiana, subsidiaries of the New York Central, has proposed to the City of Chicago to elevate their tracks in that city from the end of the present elevation, at Forty-ninth street, west to Central Park avenue, and then south to beyond Sixty-seventh street. Plans provide for 10 subway crossings, the entire project to cost between $5,000,000 and $6,000,000.

GREAT NORTHERN.—This company has applied to the Interstate Commerce Commission for authority for the construction of an extension from Scobey to Opheim, Mont., 50 miles.

MISSOURI PACIFIC.—Bids will be closed on June 3 for the construction of an eight-stall roundhouse at Osawatomie, Kans.

MONONGAHELA.—The H. K. Ferguson Company, Cleveland, Ohio, has been awarded a contract for the construction of additions to this company's Brownsville, Pa., shops to cost approximately $100,000. The work includes the addition of four bays to the erecting shops, a machine shop and a car shop. The buildings will be of steel frame construction with corrugated steel siding, brick spandrels and roofs of 2-in. wood. Wood-block floors will be used in all buildings except the car shop.

NEWBURGH & SOUTH SHORE.—This company will erect a bridge for a third track over East Seventy-first street, Cleveland, Ohio, and will lay 3,500 feet of track as a lead to a yard. The improvement will cost about $60,000. Masonry, grading and track work will be done by company forces, and the steel work on the bridge will be erected by the American Bridge Company.

NEW YORK, WESTCHESTER & BOSTON.—The New York State Public Service Commission has issued an order permitting the New York, Westchester & Boston to abandon its proposed line from White Plains, N. Y., eastward to Danbury, Conn., and north to Brewster, N. Y. The New York, New Haven & Hartford was at the same time authorized to build two additional tracks from Larchmont, N. Y., to Mamaroneck, the tracks to be leased to the Westchester company as part of a plan to extend its operations eventually to Port Chester. The New Haven owns the stock of the Westchester. President, L. S. Miller, of the Westchester, stating that it would cost about $4,000,000 to extend his line to Port Chester, said that it would be impossible to finance this extension unless relief could be had from the obligation to construct the extensions to Danbury and Brewster.

The order authorizing the New Haven to lay tracks from Larchmont to Mamaroneck prescribes the manner in which the new tracks shall cross the streets in the villages of Larchmont and Mamaroneck.

READING.—A contract has just been awarded to the Hughes-Foulkrod Company, Pittsburgh, Pa., covering the construction of a freight car repair shop at Reading, Pa.

RICHMOND, FREDERICKSBURG & POTOMAC.—This company has authorized the construction of an underpass to carry its southbound freight track under the northbound and southbound passenger tracks north of Potomac Yard. The work will involve grading and masonry for one double-track undergrade through girder bridge, estimated to cost approximately $150,000. Plans are not yet in detail shape for submission to contractors.

RICHMOND, FREDERICKSBURG & POTOMAC.—The construction of a double-track reinforced concrete arch bridge over the Rappahannock river at Fredericksburg, Va., replacing a single-track steel structure has been authorized. The work is in connection with a grade crossing elimination involving four streets. This will be accomplished by track elevation and a modified street depression. The work includes the construction of four street bridges; a concrete viaduct in front of the passenger station; the enlargement of the passenger station; the building of concrete retaining walls and embankments for the tracks. The total estimated cost of the project including the arch bridge over the river is approximately $1,000,000. Detailed plans are now being prepared and it will be some time before bids will be received.

SOUTHERN.—Plans have been prepared by this company and presented to the Alabama Public Service Commission for approval for the erection of a station at Fourth street, Anniston, Ala. The structure as planned will cost approximately $100,000.

SOUTHERN PACIFIC.—It is reported that this company is contemplating the construction of a passenger station at Waco, Texas, to be used jointly with the San Antonio & Aransas Pass which the Southern Pacific controls.

ST. LOUIS-SAN FRANCISCO.—The Railroad Commission of Arkansas has approved the plans of this company and the Missouri Pacific for the construction of a union passenger station at Hoxie, Ark., to replace the building recently destroyed by fire. The new station will be of brick, with concrete floor.

TAMPA SOUTHERN.—The Interstate Commerce Commission has authorized this company, a subsidiary of the Atlantic Coast Line, to build a line from Sarasota, Fla., in a southeasterly direction to a connection with the Atlantic Coast Line at Fort Ogden, a distance of 39 miles. Construction cost is estimated to average about $23,000 per mile.

UNION PACIFIC.—A contract has been awarded to the Atkinson-Spicer Company, Los Angeles, Cal., for the construction of a viaduct over the Los Angeles river at Macy street in Los Angeles, to cost $324,824, the cost to be divided between the Union Pacific and the Atchison, Topeka & Santa Fe, and the city and county of Los Angeles.

Loading Locomotives for Shipment to Mexico at Baldwin's Eddystone Plant

Railway Financial News

ATCHISON, TOPEKA & SANTA FE.—*Bond of Subsidiary Company.*—The Interstate Commerce Commission has granted authority to the Grand Canyon Railway to issue a first-mortgage 6 per cent bond of $300,000 to be delivered to the parent company in payment for advances for capital purposes.

BOSTON & MAINE.—*Amster Will Support Plan.*—N. L. Amster has addressed a letter to W. Rodman Peabody, chairman of the general readjustment committee of the Boston & Maine, in which he says in part:

"Despite the fact that I have felt from the beginning that the Boston & Maine could have pulled through without the need of selling the proposed $13,000,000 of 7 per cent prior preferred stock, I am now ready to co-operate with the company and with you in particular in making the financial readjustment a success at the earliest possible moment. I entirely concur with your views that with the proper spirit and co-operation, the company could sell this new prior preferred stock at par to its employees, shippers and industries on its lines.

"The Boston & Maine has fixed charges and rentals of only $7,600,000 a year and, including dividends on this new issue of prior preferred stock, would have charges and prior dividends of only $8,500,000 which equals only ten cents for each dollar of gross revenue.

"I figure that by 1927 the Boston & Maine should be in a position to earn $17,000,000 net a year, and that its fixed charges will not exceed $7,500,000, leaving over $9,000,000 for stock, or ten times the annual dividend requirements on this new issue of prior preferred."

CENTRAL OF NEW JERSEY.—1924 *Earnings.*—Annual report for 1924 shows net income after charges of $6,187,840, equivalent to $22.55 a share on $27,436,800 common stock. Net income in 1923 was $625.412, equivalent to $2.27 a share. Selected items from the income statement follow:

CENTRAL OF NEW JERSEY

	1924	1923	Increase or decrease
Railway Operating Revenues	$55,466,963	$57,383,653	—$1,916,690
Maintenance of way	$6,058,276	$5,660,110	$398,167
Maintenance of equipment	9,819,916	17,087,290	— 7,267,374
Transportation	21,640,714	23,663,630	— 2,022,916
Total Operating Expenses	$39,652,657	$48,550,289	—$8,897,631
Net Revenue from Operations	$15,814,306	$8,833,365	$6,980,941
Railway tax accruals	4,513,237	3,791,767	721,471
Railway operating income	$11,253,588	$5,026,255	$6,227,333
Equipment rents	Dr.$516,744	Cr. $48,077	$564,821
Joint facility rents	Dr.$463,593	Dr.$491,096	— $27,502
Net Railway Operating Income	$10,273,250	$4,583,236	$5,690,014
Non-operating income	$2,026,122	$2,151,258	— $125,136
Gross Income	$12,299,372	$6,734,494	$5,564,878
Rent for leased roads	$2,327,831	$2,328,081	— $250
Interest on funded debts	3,068,939	2,981,472	87,467
Total Deductions from Gross Income	$6,111,532	$6,109,082	$2,450
Net Income	$6,187,840	$625,412	$5,562,428

CHESAPEAKE & OHIO OF INDIANA.—*Tentative Valuation.*—The Interstate Commerce Commission has served a tentative valuation report as of June 30, 1916, in which the final value for rate-making purposes of the property owned is placed at $9,250,000 and that of the property used at $9,355,713. The capitalization as of valuation date was $12,914,036, and the investment in road and equipment as stated in the books was $12,519,386, which the report readjusts to $12,519,159.

CHICAGO GREAT WESTERN.—*Rumors Denied.*—Rumors current during the past week that the Atchison, Topeka & Santa Fe was seeking to acquire the Chicago Great Western were denied both by S. M. Felton, president of the Chicago Great Western, and W. B. Storey, president of the Atchison, Topeka & Santa Fe.

COLORADO & SOUTHERN.—*New Directors.*—Stephen Birch of New York, Walker D. Hines of New York and T. M. Schumacher of Chicago have been elected directors of the Colorado & Southern, succeeding Robert Rice, Bruce Scott and Charles I. Sturgis.

CHICAGO & EASTERN ILLINOIS.—1924 *Earnings.*—Annual report for 1924 shows a deficit after charges of $568,447 as compared with net income of 1923 of $1,308,133. Selected items from the income statement follow:

CHICAGO & EASTERN ILLINOIS

	1924	1923	Increase or decrease
Average mileage operated	945.13	945.13	.....
Total railway operating revenues	$26,068,789	$28,405,408	—$2,336,619
Maintenance of way	$2,604,958	$3,144,876	—$539,919
Maintenance of equipment	7,827,155	8,694,382	—867,226
Transportation	10,408,218	10,948,327	—540,110
Total operating expenses	$22,453,256	$24,279,112	—$1,825,856
Net revenue from operations	$3,615,533	$4,126,296	—$510,763
Railway tax accruals	1,445,000	1,555,000	—110,000
Railway operating income	$2,155,917	$2,563,430	—$407,513
Hire of freight cars	Dr. $202,153	Cr. $1,059,178	—$1,261,330
Net railway operating income	$1,467,259	$3,324,117	—$1,856,858
Non-operating income	386,119	444,931	—58,812
Gross income	$1,853,378	$3,769,047	—$1,915,670
Rent for leased roads	$151,754	$152,408	—$653
Interest on funded debt	2,223,749	2,257,512	—33,763
Total deductions from gross income	$2,421,825	$2,460,914	—$39,089
Net income	Def. 568,447	$1,308,133	$1,876,580
Income applied to sinking and other reserve funds, etc	$209,104	$196,171	—$12,932
Surplus for year carried to profit and loss	Def. 777,551	$1,111,962	—$1,889,513

DELRAY TERMINAL.—*Valuation.*—The Interstate Commerce Commission has issued a report finding the final value for rate-making purposes of this company's property owned and used for common carrier purposes to be $157,264 as of June 30, 1918.

ELGIN, JOLIET & EASTERN.—1924 *Earnings.*—Annual report for 1924 shows net income of $538,483 as compared with $2,592,177 for 1923. Selected items from the income statement follow:

ELGIN, JOLIET & EASTERN

	1924	1923	Increase or decrease
Average mileage operated	459.77	459.72	.05
Total railway operating revenues	$21,521,787	$27,539,298	—$6,017,511
Total operating expenses	$15,287,842	$18,483,534	—$3,195,691
Net revenue from operations	6,233,945	9,055,764	2,821,819
Railway tax accruals	$1,087,373	$1,314,899	—$227,526
Railway operating income	$5,136,917	$7,739,892	—$2,602,975
Equipment and joint facility rents, dr.	$1,825,496	$2,330,527	—$505,031
Net railway operating income	$3,311,421	$5,409,365	—$2,097,944
Non-operating income	$324,089	$372,464	—$48,375
Gross income	$3,635,510	$5,781,830	—$2,146,319
Rent for leased roads	$2,915,887	$2,550,103	$365,784
Interest on funded debt	500,000	500,000	
Net income	$538,483	$2,592,177	—$2,053,693

FORT WORTH & DENVER CITY.—*Dallas Terminal.*—The Interstate Commerce Commission has granted authority to this company to become a party to the operating agreement with reference to the use of the facilities of the Union Terminal Company of Dallas, Tex. The Fort Worth & Denver City has purchased the interest of the Trinity & Brazos Valley in the Terminal Company and will replace it as the eighth proprietary company. This decision follows the approval of the Interstate Commerce Commission for the carrier to operate by trackage rights over the Rock Island between Fort Worth and Dallas.

GRAND TRUNK WESTERN.—*Tentative Valuation.*—The Interstate Commerce Commission has served a tentative valuation report as of June 30, 1917, in which the final value for rate-making purposes of the property owned is placed at $27,306,744 and that of the property used at $29,383,944.

GREAT NORTHERN.—*Equipment Trust.*—This company has applied to the Interstate Commerce Commission for authority to assume liability as guarantor for an issue of $1,155,000 Western Fruit Express Company 4½ per cent equipment trust certificates.

ILLINOIS CENTRAL.—*Objection to Lease.*—The Kansas City Southern has filed with the Interstate Commerce Commission an objection to the proposed lease by this company of the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, asserting that the Illinois Central should be confined to its present traffic area in the interest of railroad earning power and the present rate structure in the Southwest. It is stated that the lines should be given to the Illinois Central, Kansas City Southern, Texas & Pacific, Southern Pacific and Southern to operate jointly, if the application is not denied entirely.

NEW YORK CENTRAL.—*Equipment Trusts Sold.*—J. P. Morgan & Co., the First National Bank of New York, the National City Company, the Guaranty Company of New York and Harris Forbes & Co. offered on May 22, $10,530,000 equipment trust certificates at prices to yield 4.70 per cent. Approval of this issue by the Interstate Commerce Commission was reported in the *Railway Age* of May 23.

NEW YORK, CHICAGO & ST. LOUIS.—*Securities.*—This company has applied to the Interstate Commerce Commission for authority to issue two six-months notes, one for $8,138,750 and one for $1,436,250, at 4½ per cent, to the Guaranty Trust Company of New York, for the purpose of paying Toledo, St. Louis & Western prior lien 3½ per cent bonds which mature on July 1. Authority was also asked to issue $9,575,000 refunding mortgage 5½ per cent bonds and $10,000,000 of Toledo, St. Louis & Western first mortgage 4 per cent bonds, to be pledged as collateral for the notes.

NORFOLK & WESTERN.—*Lease Approved.*—Stockholders of the Norfolk & Western approved the proposed lease of the Virginian Railway at the special meeting called for the purpose of considering the action.

WESTERN PACIFIC.—1924 *Earnings.*—Annual report of the Western Pacific Railroad Company for 1924 shows net income after charges of $1,329,265, equivalent to $4.83 a share on $27,500,000 outstanding 6 per cent non-cumulative preferred stock. Net income in 1923 was $1,819,796, equivalent after allowance for preferred dividends and sinking fund requirements to 25 cents a share on $47,500,000 common stock. All of the stock of the company is held by the Western Pacific Railroad Corporation. The report shows an increase in operating expenses in 1924 as compared with 1923 of $813,953. "The principal increase in operating expenses," the report says, "appears in maintenance of way and structures and is due to heavy expenditures necessary to prepare the paired track in Nevada for additional traffic incidental to joint operation with the Southern Pacific Company." Selected items from the income statement follow:

WESTERN PACIFIC

	1924	1923	Increase or decrease
Railway Operating Revenues	$14,370,467	$14,138,269	$232,198
Maintenance of way	2,760,367	2,293,005	467,363
Maintenance of equipment	2,519,308	2,371,894	147,414
Transportation	4,870,935	4,744,636	126,299
Total Operating Expenses	$11,477,655	$10,663,712	$813,953
Operating ratio	79.87	75.42	4.45
Net Revenue from Operations	$2,892,802	$3,474,557	—$581,755
Railway tax accruals	877,173	951,168	— 73,995
Railway operating income	$2,008,718	$2,522,208	—$513,490
Net Railway Operating Income	Not shown		
Non-operating income	$2,149,482	$1,805,139	—$344,343
Gross Income	$4,158,200	$4,327,347	—$169,147
Interest on funded debt	$1,763,121	$1,457,268	$305,853
Total Deductions from Gross Income	$2,828,935	$2,507,552	—$321,384
Net Income	$1,329,265	$1,819,796	—$490,531
Income applied to sinking fund	$50,000	$50,000	.....
Dividend appropriation of income	.....	857,560	—$857,560
Surplus for year carried to profit and loss	$1,279,265	$912,236	$367,029

Dividends Declared

Chicago & Northwestern.—Common, 2 per cent, semi-annually; Preferred, 3½ per cent, semi-annually; both payable June 30 to holders of record June 5.

Consolidated Railroads of Cuba.—Preferred, 1½ per cent, quarterly, payable July 1 to holders of record June 15.

Cuba R. R.—Common, $1.30, quarterly, payable June 30 to holders of record June 25.

Midland Valley.—Preferred, $1.25, payable June 1 to holders of record May 23.

Trend of Railway Stock and Bond Prices

	May 26	Last Week	Last Year
Average price of 20 representative railway stocks	81.06	80.75	64.20
Average price of 20 representative railway bonds	91.60	91.28	86.12

Annual Report

The New York Central Railroad Company

To the Stockholders of

THE NEW YORK CENTRAL RAILROAD COMPANY

The Board of Directors herewith submits its report for the year ended December 31, 1924, with statements showing the income account and the financial condition of the company.

The year's business

During 1924 the company moved 105,351,776 tons of revenue freight and carried 69,117,706 revenue passengers. In the transportation of its tonnage, terminals were generally free of congestion and traffic was handled expeditiously. Compared with 1923 there was a decrease of 27,224,344 in tons carried. A large part of this decrease in tonnage was in bituminous coal originating on the company's lines, unsettled economic conditions affecting union mines in the fields served by the company having resulted in a heavy falling off in output. Depression in the iron and steel industry was reflected in decreased tonnage of ore, finished metal products and other related commodities. Lake ore received by the company at Ashtabula greatly decreased. There was also a heavy falling off in the tonnage of automobiles and accessories due to lessened activity in that industry.

There was a decrease in passengers carried of 1,480,709. This was principally in local passengers other than commutation and is accounted for in large measure by the growth of automobile and motor bus competition. The commutation business showed a substantial increase.

The income account

In previous annual reports the income account of the company was so stated as to exclude the details of the operations of the Boston and Albany Railroad and of the Ohio Central Lines, the net income or deficit from these being included under "Separately operated properties—profit" or "Separately operated properties—loss", as the case might be. In this report, the income account is so stated as to include under the several headings the detailed operations of the lines referred to, this being the form in which the account is reported to the Interstate Commerce Commission. A table showing separately the income account for those lines is appended to this report.

INCOME ACCOUNT FOR THE YEAR

Including Boston and Albany Railroad and the Ohio Central Lines

OPERATING INCOME	Year ended Dec. 31, 1924	Year ended Dec. 31, 1923	Increase or Decrease
RAILWAY OPERATIONS	6,920.19 miles operated	6,889.56 miles operated	30.63 miles
Railway operating revenues	$369,606,930.30	$421,034,783.91	—$51,427,853.61
Railway operating expenses	279,970,163.07	325,917,241.26	—45,947,078.19
Net revenue from railway operations	$89,636,767.23	$95,117,542.65	—$5,480,775.42
Percentage of expenses to revenues	(75.75)	(77.41)	(1.66)
Railway tax accruals	$23,289,539.96	$22,656,867.17	$632,672.79
Uncollectible railway revenues	179,340.19	104,976.45	74,363.74
Ry. operating income	$66,167,887.08	$72,355,699.03	—$6,187,811.95
Equipment rents, net debit	$4,602,563.79	$4,482,667.26	$119,896.53
Joint facility rents, net credit	3,069,751.04	3,116,068.82	—$46,317.78
Net railway operating income	$64,635,074.33	$70,989,100.59	—$6,354,026.26
MISCELLANEOUS OPERATIONS			
Revenues	$1,133,610.80	$1,175,446.31	—$41,835.51
Expenses and taxes	970,598.42	965,162.51	5,435.91
Misc. operating income	$163,012.38	$210,283.80	—$47,271.42
Total operating income	$64,798,086.71	$71,199,384.39	—$6,401,297.68
NON-OPERATING INCOME			
Income from lease of road	$107,058.93	$120,947.04	—$13,888.11
Miscellaneous rent income	2,494,913.91	2,317,537.14	177,376.77
Miscellaneous non-operating physical property	863,946.53	782,259.64	81,686.89
Separately operated properties—profit	1,297,992.66	1,914,956.37	—616,963.71
Dividend income	14,388,778.33	14,911,849.98	—523,071.65
Income from funded securities and accounts	3,073,666.85	3,367,811.63	—294,144.78
Income from unfunded securities and accounts	1,648,527.33	1,270,761.19	377,766.14
Income from sinking and other reserve funds	127,312.22	148,620.02	—21,307.80
Miscellaneous income	121,020.09	166,433.83*	287,453.92
Total non-operating income	$24,123,216.85	$24,668,309.18	—$545,092.33
Gross income	$88,921,303.56	$95,867,693.57	—$6,946,390.01
DEDUCTIONS FROM GROSS INCOME			
Rent for leased roads	$13,027,600.30	$13,948,833.10	—$921,232.80
Miscellaneous rents	978,209.44	869,083.09	109,126.35
Miscellaneous tax accruals	306,560.43	284,880.98	21,679.45
Separately operated properties—loss	14,979.27	7,077.05	7,902.22
Interest on funded debt	34,191,311.47	33,881,249.01	310,062.46
Interest on unfunded debt	223,687.00	575,496.03	—351,809.03
Amortization of discount on funded debt	653,764.34	637,406.53	16,357.81
Maintenance of investment organization	5,315.65	5,111.58	204.07
Miscellaneous income charges	269,475.74	319,129.51	—49,653.77
Total deductions from gross income	$49,670,903.64	$50,528,266.88	—$857,363.24
Net income	$39,250,399.92	$45,339,426.69	—$6,089,026.77
DISPOSITION OF NET INCOME			
Dividends declared (7% 1924; 6½% 1923)	$20,728,835.39	$17,432,978.43	$3,295,856.96
Sinking and other reserve funds	122,103.53	144,753.67	—$22,650.14
Investment in physical property		12,917.05	—12,917.05
Total appropriations of income	$20,850,938.92	$17,590,649.15	$3,260,289.77
Surplus for the year carried to profit and loss	$18,399,461.00	$27,748,777.54	—$9,349,316.54

* Debit balance.

PROFIT AND LOSS ACCOUNT

Balance to credit of profit and loss, December 31, 1923		$121,779,107.17
ADDITIONS:		
Surplus for the year 1924	$18,399,461.00	
Profit on property sold	778,909.16	
Sundry adjustments (net), unrefundable overcharges and uncollectible bill	377,031.86	
		19,555,402.02
		$141,334,509.19
DEDUCTIONS:		
Surplus appropriated for investment in physical property	$335,970.45	
Depreciation prior to July 1, 1907, on equipment retired during year	1,581,809.11	
Loss on property retired	741,917.73	
Supplementary adjustment of accounts (net) in connection with final settlement with United States Government covering the federal control and guaranty periods	68,445.63	
Debt discount extinguished through surplus	292,918.94	
		3,021,061.86
Balance to credit of profit and loss, December 31, 1924		$138,313,447.33

Revenues, tonnage and passengers

The total operating revenues were $369,606,930.30, a decrease of $51,427,853.61.

Freight revenue was $227,359,010.07, a decrease of $46,295,971.02. Of a total decrease in tons handled of 27,224,344, coal, coke and iron ore account for 73 per cent.

Passenger revenue was $95,980,324.75, a decrease of $2,689,872.21. Interline passengers carried decreased 236,618 and local passengers 1,758,077, while commutation passengers increased 513,986.

Express revenue was $11,736,719.73, a decrease of $1,444,860.97 attributable to falling off in traffic.

Revenue from switching and demurrage was $925,186.63 less than in 1923, following the decrease in tonnage handled.

Incidental and other transportation revenues decreased $71,962.78.

OPERATING EXPENSES

Operating expenses were as follows: Group	Amount	Decrease
Maintenance of way and structures	$46,450,038.83	$4,121,794.58
Maintenance of equipment	79,217,791.64	28,247,998.90
Traffic expenses	4,272,507.08	261,036.95*
Transportation expenses	134,751,609.30	14,258,153.20
Miscellaneous operations	4,790,263.69	109,043.14*
General expenses	10,766,402.86	505,196.28*
Transportation for investment—credit	278,450.33	194,407.88
Total	$279,970,163.07	$45,947,078.19

*Increase.

The decreases in expense for maintenance of way and structures and for maintenance of equipment are incident to the unusually comprehensive maintenance program of 1923 and the reduced volume of traffic handled in 1924.

The decrease in transportation expenses is partly accounted for by the reduction in traffic. Fuel for locomotives, which accounts for 55 per cent of the total decrease for the transportation group,

[ADVERTISEMENT]

reflects not only a decreased consumption but also a lower average price per ton.

Railway tax accruals

Railway tax accruals were $23,289,539.96, an increase of $632,672.79. While there was a decrease in the amount of federal income tax, this was more than offset by heavier taxes on real estate, the result both of new property acquired and of higher rates.

Non-operating income

Profit from separately operated properties decreased $616,963.71, as the result of the smaller amount received account of operation of the Pittsburgh, McKeesport and Youghiogheny Railroad.

Dividend income decreased $523,071.65. In 1923, but not in 1924, there was included an extra dividend on stock of The Michigan Central Railroad Company amounting to $1,009,158. The decrease on this account for 1924 was partly offset by larger dividend income on stock of The Cleveland, Cincinnati, Chicago and St. Louis Railway Company, The Mahoning Coal Railroad Company and on other holdings.

Income from funded securities and accounts decreased $294,144.78, largely due to the payment by The Cleveland, Cincinnati, Chicago and St. Louis Railway Company during the year of indebtedness due this company, on demand, aggregating $10,000,000.

Income from unfunded securities and accounts increased $377,766.14. This increase was caused in part by an adjustment of interest on this company's share of the depreciation balance held by The Pittsburgh and Lake Erie Railroad Company accrued on Pittsburgh, McKeesport and Youghiogheny Railroad equipment and in part by increased income on daily bank balances.

Deductions from gross income

Deductions from gross income decreased $857,363.24.

Rent for leased roads decreased $921,232.80, due to smaller payments to The Mahoning Coal Railroad Company, offset to some extent by rental payments in connection with the lease, late in the year, of the Hudson River Connecting Railroad.

Interest on funded debt increased $310,062.46. This was principally caused by payment of dividends upon equipment trust certificates issued during the years and late in 1923. There was a decrease in interest on the company's 6 per cent convertible debentures of 1915 due to conversion of a part of those bonds into stock.

Interest on unfunded debt decreased $351,809.03. This was due to the inclusion in this account in 1923 of interest accrued on demand notes of the company held by the Treasury of the United States and liquidated in that year.

Net income before dividends and other appropriations

The net income of the company was $39,250,399.92, a decrease of $6,089,026.77.

Dividends

Dividends declared and charged against net income of the year were as follows:

Date declared	Date payable	Rate per cent	Amount
March 19, 1924....	May 1, 1924...	1¾	$5,131,412.91
June 11, 1924....	August 1, 1924...	1¾	5,131,414.66
September 10, 1924....	November 1, 1924...	1¾	5,131,433.91
December 10, 1924....	February 2, 1925...	1¾	5,334,573.91
Total.....		7	$20,728,835.39

Net corporate income

After charges for dividends aggregating $20,728,835.39 and other appropriations amounting to $122,103.53, there remained a surplus of $18,399,461, which was carried to the credit of profit and loss.

Property investment accounts

The changes in the property investment accounts for the year, as shown in detail in this report, were: Road, increase $10,399,283.14; Equipment, increase $37,027,739.43; Miscellaneous physical property, decrease $181,535.57; Improvements on leased railway property, increase $4,915,684.21, a net total increase of $52,161,171.21.

CAPITAL STOCK

The capital stock in the hands of the public on December 31, 1923, was.....		$268,323,375
On January 3, 1924, the company offered to its stockholders the right to subscribe for additional stock of the company at par to the extent of ten per cent of the par value of their several holdings of record of the company's stock at the close of business on January 2, 1924. Under this offer par value of stock was issued amounting to....	$24,902,460	
The company issued 116,110 shares, at 105, in exchange for $11,611,000 of its 20-year 6 per cent convertible debentures of 1915, together with $580,250 in cash and $300 par value of the convertible debentures received in payment of the 5 per cent premium.....	11,611,000	
		36,513,460
Capital stock in the hands of the public on December 31, 1924..		$304,836,835

The following table shows the growth in the number of stockholders from 1915:

Date	Total Number	Total Average holding	In United States Number	In United States Average holding	Abroad Number	Abroad Average holding
December 31, 1915.....	25,042	100	22,270	104	2,772	64
December 31, 1916.....	22,532	111	21,836	112	696	56
December 31, 1917.....	27,102	92	26,771	92½	331	69
December 31, 1918.....	28,693	87	28,395	87	298	69
December 31, 1919.....	30,445	82	30,180	82	265	67
December 31, 1920.....	32,396	77	32,173	77	223	64
December 31, 1921.....	34,328	73	33,824	73	504	70
December 31, 1922.....	34,319	78	33,843	78	476	70
December 31, 1923.....	34,946	77	34,502	77	444	70
December 31, 1924.....	36,282	84	35,856	84	426	66

Changes in funded debt

The changes in the funded debt of the company, in detail, were as follows:

The amount on December 31, 1923		$769,979,488.94
has been increased as follows:		
N. Y. C. Lines Equipment Trust 5 per cent certificates of June 1, 1924.....	$14,745,000.00	
N. Y. C. Lines Equipment Trust 4½ per cent certificates of September 15, 1924.....	12,720,000.00	
		$27,465,000.00
		$797,444,488.94
and has been reduced as follows:		
N. Y. C. R. R. Co. 20-year 6 per cent convertible debentures	$11,611,300.00	
Payments falling due during the year and on January 1, 1925, on the company's liability for principal installments under equipment trust agreements as follows:		
N. Y. C. Lines Trust of 1910, January 1, 1925	1,406,413.78	
M. D. T. Co. Trust of 1911, July 1, 1924....	75,000.00	
N. Y. C. Lines Trust of 1912, January 1, 1925	688,398.90	
N. Y. C. and H. R. R. Co. (Boston and Albany) Trust of 1912, October 1, 1924.....	500,000.00	
N. Y. C. Lines Trust of 1913, January 1, 1925.	742,117.61	
N. Y. C. R. R. Co. Trust of 1917, January 1, 1925	1,117,000.00	
Trust No. 43 of January 15, 1920, January 15, 1924	922,700.00	
N. Y. C. R. R. Co. Trust of 1920, April 15, 1924	1,153,167.33	
N. Y. C. Lines Trust of 1922, June 1, 1924.	572,000.00	
N. Y. C. Lines 4½ per cent Trust of 1922, September 1, 1924.....	569,000.00	
N. Y. C. Lines Trust of June 1, 1923, June 1, 1924	462,000.00	
Purchase by the company of its 20-year 6 per cent convertible debentures.....	709,000.00	
(These bonds were resold after the end of the year.)		20,528,097.62
Leaving the funded debt on December 31, 1924.....		$776,916,391.32

a net increase of $6,936,902.08.

New York Central Lines Equipment Trust of 1924

This trust was created by agreement dated June 1, 1924, to which The New York Central Railroad Company, The Michigan Central Railroad Company, The Cleveland, Cincinnati, Chicago and St. Louis Railway Company and The Cincinnati Northern Railroad Company are parties. Under the trust, $25,050,000 of 5 per cent equipment trust certificates maturing in equal installments of $1,670,000 over a period of fifteen years were issued, representing approximately 75 per cent of the cost of the equipment leased by the Trustee to the railroad companies. The equipment allotted to this company under the trust, costing $19,742,113.20, consists of 32 Mikado locomotives, 29 switching locomotives, 60 coaches, 50 baggage cars, 1,400 box cars, 1,000 auto box cars, 2,400 hopper cars and 440 refrigerator cars. The certificates are prorated among the railroad companies in proportion to the cost of the equipment allotted to each, this company's share being $14,745,000.

New York Central Lines four and one-half per cent Equipment Trust of 1924

This trust was created by agreement dated September 15, 1924, to which The New York Central Railroad Company, The Michigan Central Railroad Company and The Cleveland, Cincinnati, Chicago and St. Louis Railway Company are parties. Under the trust, $20,955,000 of 4½ per cent equipment trust certificates maturing in equal annual installments of $1,397,000 over a period of fifteen years were issued, representing approximately 75 per cent of the cost of the equipment leased by the Trustee to the railroad companies. The equipment allotted to this company under the trust, estimated to cost $16,979,012.44, consists of 18 Mikado freight locomotives, 5 Pacific passenger locomotives, 25 switching locomotives, 65 coaches, 19 dining cars, 18 combination passenger and baggage cars, 28 horse cars, 60 express refrigerator cars, 1,600 box cars and 2,600 hopper cars. The certificates are prorated among the railroad companies in proportion to the cost of the equipment allotted to each, this company's share being $12,720,000.

[ADVERTISEMENT]

The Cleveland Union Terminals Company

During the year The Cleveland Union Terminals Company issued and sold an additional $10,000,000 of its fifty-year 5 per cent mortgage bonds of series B, which were jointly guaranteed by this company and the other proprietors of the Terminals Company under the guaranty agreement dated July 17, 1923.

Progress was made in the acquisition of land, excavation in the station area and on bridge work.

Reading rights

The company offered to its stockholders of record at the close of business on February 1, 1924, the right to purchase on or before May 1, 1924, so-called "Reading rights" at $3 per right to the extent of one right for each five shares of stock held. Such rights, to the number of 603,650, were received by this company as a stockholder of the Reading Company. Each two of the rights entitle the holder to subscribe for a Certificate of Interest in one share of the stock of Philadelphia Coal and Iron Company as $4 per share. A detailed description of these rights was given in the annual report for 1923. Under the terms of the offer 557,778 of these rights were sold by the company to its stockholders or their assigns, for which the company received $1,673,334. During the year the company sold the remaining 45,872 rights on the market, realizing $934,543.48 net.

Consolidation of railways

In the report for 1923 attention was called to the pendency of the proceeding before the Interstate Commerce Commission for the consolidation of the railways of the continental United States into a limited number of systems, and reference was made to the manner in which such proceeding might affect the interest of the New York Central Lines. It was stated that the taking of testimony by the Commission was concluded in December, 1923.

The case was argued and submitted in January, 1924. No report has yet been made by the Commission. However, the subject of the grouping of the railroads has continued to receive the consideration of the Commission and of railroad managements.

Among those called upon to deal with the subject there is a growing appreciation of the difficulty of making, in advance of any consolidations, final plans for the allocation of all the railways of the country, and there are those who advocate an amendment of the law which will permit the Commission to approve specific consolidations in harmony with the general purposes of the law in advance of the promulgation of all-inclusive plans.

West Side improvements, New York City

The 1923 report contained the statement that the company had applied to the Public Service Commission asking it to take action under the Act of the Legislature of the State of New York passed in 1923 making it unlawful for any railroad operating within the limits of Greater New York to operate after January 1, 1926, within the limits of the city, with any motive power except electricity. The Legislature at its session in 1924 passed an Act amending the Act of 1923 by including, in effect, the cities of Yonkers and Mount Vernon as cities adjoining New York. That part of the Putnam Division within the city of Yonkers is therefore covered by this Act. Supplemental petition covering that road for the action of the Public Service Commission has been presented to the Commission.

At the 1925 session of the Legislature a bill, introduced at the instance of the railroad companies concerned, amending the foregoing Acts and extending the time until the first day of January, 1929, was passed by both Houses of the Legislature but was vetoed by the Governor.

On the company's application to the Transit Commission for the elimination of grade crossings within its jurisdiction the Commission has taken action by making an order for the elimination of grade crossings at or near Manhattanville and also at Dyckman Street. This order, however, is not effective unless or until the Legislature shall make the necessary appropriation for the State's share of the expense.

Hudson River Connecting Railroad—Castleton Cut-off

During the year the main line of this road from the east end of the bridge to Feura Bush and the branches to Ravena on the West Shore Railroad and to Post Road Crossing on the Boston and Albany Railroad, as well as the main yard at Selkirk, the engine terminal, power house, water station, coal chutes, ash pits and auxiliary buildings, and a building for the Young Men's Christian Association with housing facilities for 100 people, were completed.

The road and bridge were formally opened on November 20, 1924, by appropriate ceremonies, which included the inspection of the bridge and property and at which were present the Board of Directors, representatives of the State Governments of New York and Massachusetts, of the Interstate Commerce Commission, of the Public Service Commissions of New York and Massachusetts, and about 1,000 people representing public and private interests.

The bridge has been dedicated at the "Alfred H. Smith Memorial Bridge."

Freight traffic to and from the River Division was turned over the line on November 15, 1924, freight traffic to and from the Boston and Albany Railroad was turned over it on November 23, 1924, and partial operation of freight traffic to and from the Hudson Division was begun on December 27, 1924. By the end of the year, about 3,000 cars per day were being handled.

It is expected that the entire project, so far as the initial development is concerned, will be completed during 1925.

Acquisition of capital stock of The Cleveland, Cincinnati, Chicago and St. Louis Railway Company

The company acquired during the year 148 shares of the preferred stock of The Cleveland, Cincinnati, Chicago and St. Louis Railway Company at a cost of $12,839. At the end of the year the company held 84.69 per cent of the preferred, 91.31 per cent of the common, or 90.15 per cent of the total outstanding capital stock of The Cleveland, Cincinnati, Chicago and St. Louis Railway Company.

Acquisition of capital stock of The Michigan Central Railroad Company

The company acquired during the year 20 shares of the capital stock of The Michigan Central Railroad Company at $350 per share, making its holdings on December 31, 1924, 177,667 shares of a par value of $17,766,700, or 94.82 per cent of the total outstanding.

Acquisition of capital stock of The Mahoning Coal Railroad Company

The company acquired during the year 180 shares of the preferred stock of The Mahoning Coal Railroad Company at $50 per share, making a total of 9,158 shares of preferred stock held by it. The proportion of preferred stock now held by the company is 69.23 per cent, of common stock 59.64 per cent, and of the total outstanding 62.58 per cent.

Sale to The New York, Chicago and St. Louis Railroad Company of line between Dunkirk and Silver Creek, New York

The Lake Shore and Michigan Southern Railway Company, under date of December 31, 1892, leased a piece of double-track line, 7.84 miles in length, between Dunkirk and Silver Creek, New York, to The New York, Chicago and St. Louis Railroad Company for a term of ninety-nine years, renewable by the lessee forever, at an annual rental of $5,000, with a provision that the lessee should have the right at any time to pay the lessor $100,000 in commutation of the annual rent. The lessee gave the necessary notice of its election to commute the annual rent and, accordingly, by deed dated March 26, 1924, the property was conveyed to The New York, Chicago and St. Louis Railroad Company in consideration of the cash payment of $100.000

Improvements and economies

Improvements are being made in the company's plant and in methods of operation in order to provide additional capacity to meet increased requirements and to reduce the cost per unit of service rendered. Efforts toward economy in operation have been particularly necessary since the return of the railroads to their owners following the Federal control period because railroad operations must be carried on in the face of labor and material costs which have increased relatively more than revenues have increased from rate advances. While revenues due to rate changes are now approximately 57 per cent higher than they were ten years ago, the items entering into the cost of operation including taxes are approximately 81 per cent higher.

The amount of service rendered the public in 1924 was not as great as in the year previous, due to a falling off in business activity, but, as the result of economies, the cost per unit of traffic handled was less, and the amount of income available for capital per unit of service performed was greater, in 1924 than in 1923. Continuance of expenditures to provide added capacity and to produce economy is necessary if the company is to earn a satisfactory return for its security owners. The ability to make such expenditures will depend on the preservation of a rate level that will provide a surplus sufficiently large to maintain credit and attract investors. Any reduction in rates which would not permit this would react to the detriment of the public because of the consequent impairment of the ability of the company to provide the facilities needed for increased and high class service.

Appreciative acknowledgment is made to officers and employees of their loyal and efficient co-operation and service.

For the Board of Directors,

PATRICK E. CROWLEY,
President.

[ADVERTISEMENT]

Railway Officers

Operating

J. C. Torpey has been appointed assistant superintendent of transportation of the Delaware & Hudson.

J. W. Daniel has been appointed superintendent of the Savannah district of the Atlantic Coast Line, with headquarters at Savannah, Ga., succeeding **G. D. Pugh**, deceased. **W. M. Black** has been appointed trainmaster of the Savannah district, with headquarters at Savannah, Ga. These appointments are effective June 1.

L. B. McDonald, superintendent of the Houston division of the Southern Pacific, with headquarters at San Antonio, Tex., has been promoted to assistant general manager, with headquarters at Houston, Tex., a newly created position. **A. C. Mims,** superintendent of the Victoria division, with headquarters at Victoria, Tex., has been transferred to the Houston division, succeeding Mr. McDonald. **G. B. Goodloe,** assistant general manager of the San Antonio & Aransas Pass, has been appointed superintendent of the Victoria division, succeeding Mr. Mims. **H. F. Kelly** has been appointed assistant superintendent of the Austin division, with headquarters at Austin, Tex. **C. A. Maxwell,** division superintendent on the San Antonio & Aransas Pass, with headquarters at San Antonio, Tex., has been appointed trainmaster of the El Paso division of the Southern Pacific, with headquarters at Del Rio, Tex. **E. D. Butler** has been appointed trainmaster of the Victoria division, with headquarters at Kennedy, Tex. **J. H. Smith,** division superintendent on the San Antonio & Aransas Pass, with headquarters at Yoakum, Tex., has been appointed trainmaster of the Victoria division of the Southern Pacific, with the same headquarters. **J. J. Moore** has been appointed trainmaster of the Austin division, with headquarters at Austin, Tex. These changes have all been made pursuant to the merger of the San Antonio & Aransas Pass with the Southern Pacific Lines in Texas.

PENNSYLVANIA COMBINES TWO REGIONS

The directors of the Pennsylvania Railroad, at a meeting on May 27, decided to combine the company's operations in the Northwestern and Southwestern regions of the system. The change will be effective June 1. Its purpose is to obtain the advantages of a more concentrated administration of the service and facilities in the territory affected.

The consolidated region will be known as the Western region, and will be under the general jurisdiction of T. B. Hamilton, vice-president and general manager, whose chief office will remain at Chicago. Benjamin McKeen, hitherto in charge of the Southwestern region, will continue at St. Louis as resident vice-president to represent the company's interests in that general territory.

In connection with these changes, I. W. Geer, hitherto general manager, Southwestern region, has been appointed assistant general manager of the new Western region with headquarters at Chicago.

R. G. Bennett, general superintendent of motive power, Southwestern region, has been transferred to Philadelphia as general superintendent motive power, Eastern region. J. M. Henry, at present general superintendent motive power, Eastern region, will become assistant chief of motive power—locomotive—on the staff of the chief of motive power of the Pennsylvania System. A. C. Davis, at present assistant chief of motive power—locomotive—has been transferred to Altoona, Pa., as assistant works manager. At Altoona, Mr. Davis will succeed T. B. Farrington, who has been transferred to Chicago as assistant general superintendent motive power of the new Western region.

E. B. Pry, superintendent telegraph and signals of the Southwestern region, has been transferred to Pittsburgh, where he will occupy the corresponding position in the Central region. W. M. Post, hitherto superintendent of telegraph and signals of the Central region, has been transferred to Philadelphia as assistant chief signal engineer on the staff of the chief signal engineer of the system.

W. R. Armstrong, whose promotion to general superintendent of the Los Angeles & Salt Lake, with headquarters at Los Angeles, Cal., was reported in the *Railway Age* of April 25, was born in August, 1869, in Kansas City, Kan., and was educated at the University of Kansas. He entered railway service in May, 1889, as an axman on the Kansas City, Wyandotte & North Western, later a part of the Kansas City & Northwestern, and in November, 1890, was appointed foreman of a bridge construction gang on the Middlesborough Belt Railway, now a part of the Louisville & Nashville. Mr. Armstrong entered the service of the Kansas City Southern in May, 1892, in the engineering department, and subsequently held various positions there, including that of division engineer. In March, 1895, he was promoted to superintendent of construction where he remained until March, 1900, when he was appointed locating engineer and superintendent of construction of the Kansas City, Mexico & Orient. Mr. Armstrong entered the service of the Oregon Short Line in November, 1905, as assistant engineer in charge of construction work. He was promoted to acting superintendent of the Montana division in October, 1908, and in February, 1909, was appointed assistant superintendent of the Idaho division. He was again appointed acting superintendent of the Montana division in August, 1909, and in November of that year was promoted to superintendent of the Montana division. Mr. Armstrong was appointed general manager and chief engineer of the Salt Lake & Utah in April, 1913, where he remained until July, 1916, when he was appointed engineer maintenance of way of the Union Pacific. He was promoted to assistant chief engineer of the Oregon Short Line, with headquarters at Salt Lake City, Utah, in May, 1919, where he remained until his recent promotion to general superintendent of the Los Angeles & Salt Lake.

W. R. Armstrong

Mechanical

F. L. Carson, mechanical superintendent of the San Antonio & Aransas Pass, has been appointed assistant superintendent of motive power and equipment of the Southern Pacific, lines in Texas, with headquarters at Yoakum, Tex., pursuant to the merger of the San Antonio & Aransas Pass with the Southern Pacific. **J. E. Frels,** master mechanic of the San Antonio & Aransas Pass, at Yoakum, Tex., has been appointed master machanic of the Southern Pacific, with the same headquarters.

Purchasing and Stores

W. E. Lefaivre, purchasing agent of the Denver & Rio Grande Western, with headquarters at Denver, Colo., has been appointed general storekeeper, with the same headquarters, succeeding W. B. Hall, promoted.

Obituary

J. L. Earls, division engineer of the Chattanooga division of the Nashville, Chattanooga & St. Louis, with headquarters at Chattanooga, Tenn., died on May 3 after an extended illness.